SCIENTIFIC ANOMALIES AND OTHER PROVOCATIVE PHENOMENA

An Annotated Outline of 6,000 Entries

Compiled by:

William R. Corliss

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"ROUND ABOUT THE ACCREDITED AND ORDERLY FACTS OF EVERY SCIENCE THERE EVER FLOATS A SORT OF DUST-CLOUD OF EXCEPTIONAL OBSERVATIONS, OF OCCURRENCES MINUTE AND IRREGULAR AND SELDOM MET WITH, WHICH IT ALWAYS PROVES MORE EASY TO IGNORE THAN TO ATTEND TO .... ANYONE WILL RENOVATE HIS SCIENCE WHO WILL STEADILY LOOK AFTER THE IRREGULAR PHENOMENA. AND WHEN THE SCIENCE IS RENEWED, ITS NEW FORMULAS OFTEN HAVE MORE OF THE VOICE OF THE EXCEPTIONS IN THEM THAN OF WHAT WERE SUPPOSED TO BE THE RULES."

William James

Illustrations initialed JCH are the work of John C. Holden.

INTRODUCTION

OBJECTIVES

Over the past four decades, I have amassed a collection of roughly 50,000 articles and shorter items from the scientific literature. Each was selected because it seemed to challenge a paragigm of science or was in some way "provocative" in that it suggested that we have not yet discovered all of the elements in Nature's grand scheme.

Although I have already published 37 books detailing over 2,000 scientific anomalies and "provocative" phenomena, the cataloging task is barely half done.

At this midpoint of the effort, it seems worthwhile to stand back at look at what has been accomplished and what mysteries of the natural world have not yet been cataloged. Therefore, in this book, I spread out in print the vast scope of scientific anomalies, as seen in a deep, eclectic, one-person search of the literature of science. I include those phenomena already identified in my previous books and the many more that merit space in my files but which have not yet been fully analyzed. It should not surprise anyone that this Outline contains about 6,000 entries, all of which remain unexplained to my satisfaction or which, at the very least, I find very curious and engaging.

This Outline is one person's attempt to grasp better the full scope of the cosmos by mapping its terra incognitae. Hopefully, it will be useful and stimulating to others.

My major objectives are these:

- The compilation of a list of scientific phenomena worthy of further attention and research;
- The presentation of a "first look" at the entire spectrum of what I have found anomalous, provocative, and exciting in science (It is very large realm as you shall see.); and
- The provision, via a menu-type index, of a guide to my many already-published Catalogs and Handbooks of anomalies and curiosities.

SOURCES

My library focus has always been the major science journals and magazines. Starting with the complete files of Nature and Science, I have systematically gone through these two journals as well as dozens of other reliable, general-science publications. Additionally, I have trawled through many first-line journals in astronomy, biology, and other disciplines. Books have been used only sparingly, and the Web hardly at all.

Each chapter of the Outline begins with a list of those serials that I have found most useful in each specific discipline. In parentheses, at the end of each journal citation, I list the number of volumes of that publication I have examined. If all are counted, the total number of volumes surveyed comes to about 15,000.

Each of the 244 illustrations in the Outline includes in its caption a pertinent, useful reference, although it may not be the source of the figure.

At the end of the Outline, the 27 major publications of the Sourcebook Project are listed and numbered. These reference numbers appear as superscripts on the titles of each Section. These 27 publications (Catalogs and Handbooks) contain detailed descriptions and evaluations of about 2,000 of the phenomena listed in this Guide, as well as many references.

CODING SCHEME

An alpha-numerical code pervades this Outline. The code begins with a triplet of letters. The first letter refers to a specific Chapter (G for Geophysics, for example). The second letter refers to some obvious property of many geophysical phenomena (L for Luminous, for example). The doublet GL heads the Outline Section dealing with luminous geophysical phenomena. The third letter is even more specific (B for Ball lightning, for example). The triplet GLB leads the Subsection covering ball lightning. If a number follows the triplet of letters,

it designates a phenomenon already covered in detail in one of my catalogs (GLB2, for ball lightning with spikes). A lower case letter following the triplet of capital letters marks an uncataloged phenomenon for which I maintain a file. This lower case letter will be replaced by a numeral when that particular phenomenon is treated more fully in a new Catalog volume.

All pagination and cross references utilize these alphanumerical codes.

ILLUSTRATIONS

This first iteration of the Outline includes 244 illustrations drawn from extant Sourcebook Project publications. These provide useful examples of phenomena as well as relief from the rather tedious Outline. Illustration captions include specific references regarding the phenomena shown, plus the applicable code.

ENTRY CHARACTERISTICS

The 6,000 or so entries in this edition of the Outline are headed by descriptive titles. Sometimes amplification of the title seems necessary and an annotation is provided, perhaps accompanied by an example or two in telegraphic form. Cross references to similar and related entries are coded and enclosed in brackets.

Entries that are general in nature are usually divided into more specific phenomena using decimal notation.

Some entries refer to files that contain philosophical or debunking material. In other words, not all entries represent anomalous phenomena.

MENU-INDEXING AND PAGINATION

The Outline's pages are numbered as they are in conventional books, these numbers appear on the inside upper corners of the pages. More useful to the user of this Outline are the alphanumerical codes of the first and last entries on each page, which are found on the outside upper corners of the pages.

No conventional index is provided. Actually, many of the phenomena have no names, so that a "field-guide" approach seems better. One should find specific subjects with the menus. Each Chapter has a introductory menu which will lead to a more narrowly defined Section. Each of these Sections offers an even more specific menu, which leads to a list of entries that, hopefully, contains subjects of interest to the searcher, as well as cross references to related phenomena elsewhere in the Outline.

A WORK-IN-PROGRESS

Even after four decades of library research, this Outline is woefully incomplete. Every scientist will be able to think of phenomena that should be added. My continuing perusal of current and past science publications, plus suggestions submitted by others, ensure a substantial future expansion of the Outline in its next iteration.

PROJECTED IMPROVEMENTS AND EXPANSIONS

- Additions of new phenomena that arrive in a never-ending stream;
- The simplification of the format, which is presently wasteful of space;
- Addition of more illustrations;
- Enhancement and clarification of some of the more abstruse and/or vague entries, especially in regard to why it is considered anomalous or "provocative"; and
- The addition of entries from our very large files on invertebrates (BI), plants (BP), microorganisms and cells (BL), and biochemistry and genetics (BG).

EXPLANATIONS AND HYPOTHESES

For each entry in the Outline, there will exist at least one explanation that satisfies one or a few people. In my view, though, doubts exist for all entries, or they would not be listed. However, some of the Outline's phenomena will ultimately be accounted for---even to my satisfaction. Everything admitted

to this Outline is, of course, a matter of personal judgment.

MAJOR PARADIGMS TARGETED

Anomalies exist only when they challenge paradigms and hypotheses. It is unavoidable, therefore, that some paradigms, widely considered to be fact, will be contradicted by many of the phenomena listed in this Outline. For example, the following paradigms that presently dominate scientific thinking are here considered to be at risk:

- The expanding universe;
- The Big Bang origin of the universe;
- Neo-Darwinism (specifically, evolution via random mutation and natural selection);
- That genomes are the complete blueprints for life forms;
- Plate tectonics/continental drift;
- Special and General Relativity.

FEEDBACK INVITATION

Being as this is a work-in-progress, feedback is welcomed, including new entries (as accompanied by references to the science literature), typo corrections, errors of fact (with references), and format improvements. Any incontrovertible explanations of listed phenomena will be entertained only if accompanied by citations of reliable science journals. (Address: Sourcebook Project, P.O. Box 107, Glen Arm, MD 21057 USA)

SOURCEBOOK-PROJECT BACKGROUND

A 15-page history of the Project may be found in the Journal of Scientific Exploration, 16:439, 2002.

FIRST-LEVEL MENU AND GENERAL SOURCES

A ASTRONOMY
B BIOLOGY
C CHEMISTRY & PHYSICS
E GEOLOGY
G GEOPHYSICS
M ARCHEOLOGY
P PSYCHOLOGY
X MISCELLANEOUS PHENOMENA
SOURCEBOOK REFERENCES

PRIMARY GENERAL-SCIENCE SOURCES EXAMINED

American Association for the Advancement of Science, Proceedings (53 vols.)
American Journal of Science (301 vols.)
American Philosophical Society, Proceedings (114 vols.)
American Scientist (90 vols.)
British Association, Reports (105 vols.)
Daedalus (40 vols.)
Discover (23 vols.)
Discovery (47 vols.)
Eclectic Magazine (68 vols.)
English Mechanic and World of Science (129 vols.)
Explorers Journal (42 vols.)
Folklore (87 vols.)
Franklin Institute, Journal (201 vols.)
Journal of American Folklore (81 vols.)
Journal of Scientific Exploration (16 vols.)
Knowledge (43 vols.)
National Academy of Sciences, Proceedings (76 vols.)
Nature (419 vols.)
New Scientist (175 vols.)
Philosophical Magazine (181 vols.)
Science (297 vols.)
Science Digest (78 vols.)
Science News (formerly *Science News Letter* (161 vols.)
Science Progress (63 vols.)
Scientific American (284 vols. including "old" series)
Scientific American Supplement (88 vols.)
Scientific Monthly (85 vols.)
Skeptical Inquirer (26 vols.)
Smithsonian Institution, Annual Report (64 vols.)
Smithsonian Institution Contributions to Knowledge (35 vols.)
Smithsonian Institution Institution Miscellaneous Publications (153 vols.)
Victoria Institute, Journal of the Transactions (83 vols.)

A ASTRONOMY

AA ASTEROIDS
AB SOLAR SYSTEM "LAWS" AND INTERRELATIONSHIPS
AC COMETS
AD INTERSTELLAR CLOUDS
AE ENIGMATIC OBJECTS
AF UNBOUND OBJECTS
AG THE EARTH
AH MERCURY
AJ JUPITER
AL THE MOON
AM MARS
AN NEPTUNE
AO STARS AND EXTENDED LUMINOUS OBJECTS
AP PLUTO
AQ QUASARS
AR SATURN
AS THE SUN
AT THE COSMOS
AU URANUS
AV VENUS
AW GALAXIES
AX PLANET X
AY METEORS AND METEORITES
AZ THE ZODIACAL LIGHT

PRIMARY SCIENCE SOURCES EXAMINED IN ASTRONOMY

Astronomical Journal (90 vols.)
Astronomical Register (23 vols.)
Astronomy (30 vols.)
Astrophysical Journal (101 vols.)
British Astronomical Association Journal (110 vols.)
Earth and Planetary Science Letters (73 vols.)
Icarus (147 vols.)
Mercury (formerly Astronomical Society of the Pacific, Publications (105 vols.)
Moon, The (25 vols.)
Observatory (109 vols.)
Popular Astronomy (59 vols.)
Royal Astronomical Society, Monthly Notices (211 vols.)
Royal Astronomical Society, Quarterly Journal, (24 vols.)
Royal Astronomical Society of Canada, Journal (77 vols.)
Sky & Telescope (103 vols.)
Strolling Astronomer (25 vols.)

AA ASTEROIDS[7]

AAB ASTEROID CELESTIAL MECHANICS
AAE ASTEROID GEOLOGY
AAL ASTEROIDS WITH SATELLITES
AAO ANOMALOUS ASTEROID OBSERVATIONS
AAX ASTEROID OCCULTATION PHENOMENA
AAZ ASTEROIDS WITH AND WITHOUT MAGNETIC FIELDS

Several thousand asteroids have been officially cataloged. Their sizes range from a few kilometers in diameter to 960 kilometers for Ceres, the largest of the "minor planets." Most asteroids orbit the sun between Mars and Jupiter in the so-called asteroid belt. Some maverick asteroids, though, penetrate well beyond Venus toward sun; others ply highly inclined and eccentric orbits. Many asteroids are sound and dense, but others seem to be merely low-density conglomerations of loose rubble held together weakly by gravity.

The origin of the asteroids has long been a puzzle to astronomers. Are they the debris of an exploded planet? Or are they somehow related to comets, being perhaps just burnt-out comets?

AAB ASTEROID CELESTIAL MECHANICS

AAB1 Anomalous Asteroid Orbits
1.1 Asteroids That Stray Far from the Recognized Belts (e.g.; the Apollo asteroids)
1.2 "Puffed-Up" Nature of the Main Belt [AAB3]

AAB2 Asteroid Distribution Anomalies (e.g.; unexplained clumps and gaps) (Even the famous Kirkwood gaps, thought to be caused by Jupiter, are not satisfactorily explained.)

AAB3 The High "Internal Energy" of the Asteroid Population [AAB1]

AAB4 Peculiar Distribution of Asteroid Spin Rates (e.g.; larger asteroids spin faster)

AAB5 Unexplained Residual Precession of Icarus

AAB6 Evidence against an Explosive Origin for Asteroids (e.g.; asteroid orbits incompatible with hypothesis)

AABa Earth's Asteroid Companion (e.g.; asteroid 3753)

AABb Unknown Origin of Near-Earth Objects (NEO's)

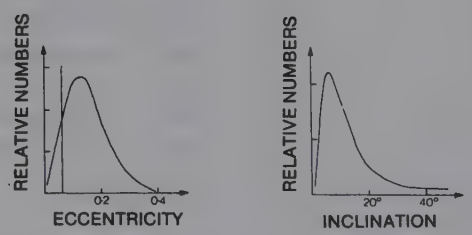
AABc Unknown Fate of the Asteroid-Belt's "Supposed" Missing Mass (Ejection from solar system proposed.)

AABd Controverted Theories of Asteroid Origin

AABe Puzzle of Small, Low-Spin-Rate Asteroids (Implication is that they are only rubble piles.)

AABf Possible Artificial Asteroids (Asteroid 1991 VG probably artificial but not man-made!)

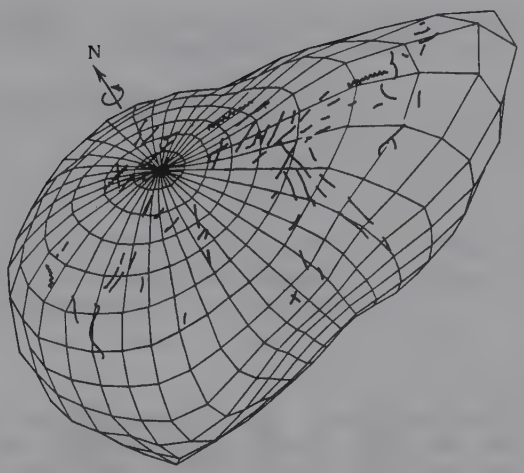
AABg Comet-Like Asteroids [AAOf, ACB]



Asteroid distribution in eccentricity and inclination, illustrating the "puffed up" nature of the asteroid belt. (The Cosmic Serpent, 1982, pp. 66-70.) [AAB1]

AAE ASTEROID GEOLOGY

AAE1 Unexpected Surface Characteristics (e.g., melted surfaces, icy surfaces [AAEc, AAEf]
AAE2 Asteroid Compositional Belts (Silicaceous belts closer to sun, carbonaceous farthest away.)
AAEa Low-Density Asteroids (Asteroid Mathilde 1.3 grams/cm^3 suggests a rubble pile.)
AAEb Dearth of Asteroids with Chondritic Compositions
AAEc Red Asteroids with Possible Organic Coatings (e.g.; 1992 AD)
AAEd Radar Evidence of Metallic Asteroids (e.g.; 1986 DA)
AAEe Asteroid-Groove Power Law
AAEf Unexplained Blocks, Chutes, Smooth Surfaces [AAOb]



The highly irregular shape of the asteroid Gaspra is marked by many grooves. Average radius of Gaspra: 6.1 kilometers. (Icarus, 107:72, 1994. [AAOa]

AAL ASTEROIDS WITH SATELLITES

AALa Asteroids with Satellites (A surprisimg number exist. Why?) (e.g.; Gaspra) [ACLa]

AAO ANOMALOUS ASTEROID OBSERVATIONS

AAOa Systems of Grooves and Other Linear Features
AAOb Puzzle of Shattered Rocks on Asteroid Surfaces [AAEf]
AAOc Possible Layered Structures (These imply a complex history.)
AAOd Grotesque Shapes (e.g., dumbbells) [AALa]
AAOe Immense Impact Craters on Some Asteroids
AAOf Asteroids with Cometary Features (Some objects classified as asteroids exhibit comas, tails, and eject gas. The distinction between asteroids and comets has become blurred. Yet, they are supposed to have had different histories.) [ACB, ACO]
AAOg Asteroids with Extreme Elongations (e.g.; pencil-shape)

AAX ASTEROID OCCULTATION PHENOMENA

AAX1 Anomalous Occultations of Stars by Asteroids (i.e.; premature brightness reductions) [ALX8]

AAZ ASTEROIDS WITH AND WITHOUT MAGNETIC FIELDS

AAZa Asteroids with Difficult-to-Explain Magnetic Fields (e.g., Gaspara, Ida)
AAZb Asteroids without Magnetic Fields (e.g.; Eros)

AB SOLAR SYSTEM "LAWS" AND INTERRELATIONSHIPS[7]

ABB DYNAMICS OF THE SOLAR SYSTEM AS-A-WHOLE
ABS REMARKABLE RELATIONSHIPS AMONG PLANETARY AND SATELLITE PARAMETERS

The solar system as-a-whole possesses many interesting and curious properties that provide clues about its origin and evolution. Some of these properties are anomalous because they imply a history different from the accepted condensation/accretion scenario and the dogma of long-term stability.

Solar-system dynamic properties engender questions, such as: Why do the planets possess so much more angular momentum than the sun? One also must inquire why the Titius-Bode Law and similar relationships among solar-system parameters work so well.

ABB DYNAMICS OF THE SOLAR SYSTEM AS-A-WHOLE

ABB1 Solar-System Instability (e.g.; possibility of future ejection of one of more planets)

ABB2 Near-Circularity of Most Planetary Orbits

ABB3 Anomalous Split of Angular Momentum between Sun and Planets (An astounding 1:180 ratio)

ABB4 Ubiquity of Resonances in the Solar System (Interesting but not anomalous.)

ABBa Unexplained Cases of Anomalous Stellar Aberration (Some spectroscopic binaries have identical aberrations.)

ABBb Chaotic Planetary Orbits in the Solar System

ABBc Chaotic Rotation of Some Satellites

ABBd Unexplained Origin of Planetary and Satellite Spins [ABB3]

ABBe High Theoretical Likelihood of the Formation of Many Earth-Like Objects

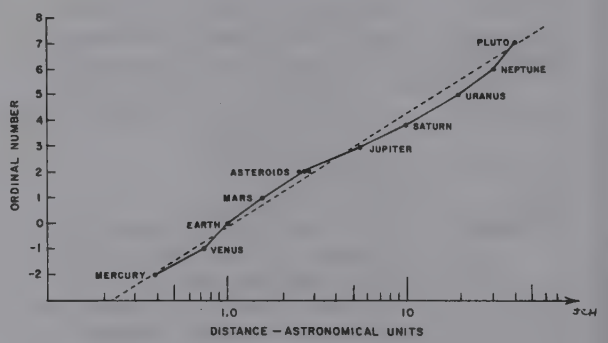
ABBf Arguments Favoring Geocentricity (These are interesting and not completely trivial.)

ABBg Evidence for Great Disorder in the Early Solar System (Early disorder not expected in some theories.)

ABBh Planet-Formation Theories (A surprising lack of consensus exists.)

ABS REMARKABLE RELATIONSHIPS AMONG PLANETARY AND SATELLITE PARAMETERS

ABS1 Solar System Laws of Distance (e.g.; Bode's Law) (Is it merely coincidence?)



Planet ordinal number versus its distance from the sun. The dashed line represents a geometric progression. (Nieto, M.M.; The Titius-Bode Law of Planetary Distances..., 1972. [ABS1]

ABS2 Remarkable Similarity of Densities of Two Hypothetical Composite Planets (The two planets are Mercury-Venus and Earth-Moon-Mars. Is there a genetic relationship?)

ABS3 Multiple Primaries in the Ancient or Future Solar System (Present solar-system parameters do not rule out either!)

ABS4 Supposed Quantization of Planetary Orbital Periods [ABS6]

ABS5 Solar-System Mass Laws (These are like Bode's distance law but involve masses instead.)

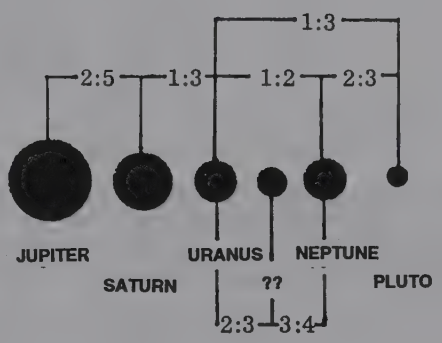
ABS6 The General Quantized Nature of Orbital Systems (The application of the laws of quantum mechanics to all orbital systems.)

ABSa Planets that "Seem" to Avoid One Another---Orbitally Speaking (e.g.; Neptune and Pluto)

ABSb Musical Models of the Solar System

ABSc Speculations Pro and Con on a Vanished or Exploded Solar-System Planet

ABSd Planetary Conjunctions that Influenced Human History (Psychologically speaking, of course,



One model of the solar system based on the simple ratios of their orbital periods has a spot for a "missing" planet. (Sky & Telescope, 73:371, 1987. [ABSc]

AC COMETS[7]

ACB	ORBITAL ANOMALIES OF COMETS
ACE	THE GEOLOGY OF COMETS
ACF	ELECTROMAGNETIC EMISSIONS FROM COMETS
ACL	COMETS WITH SATELLITES
ACO	VISUAL OBSERVATIONS OF COMETS
ACR	RADAR OBSERVATIONS OF COMETS
ACX	OCCULTATIONS BY COMETS

With their long, flaming tails, the major comets attract worldwide attention as they approach the sun and flare up to naked-eye visibility. Comets are generally believed to be composed of volatile ices combined with rocky material. It is the sun's heat and solar wind that cause them to flare up when they enter the inner solar system.

Until recently, all comets were thought to originate in the postulated Oort Cloud of icy objects at the fringes of the solar system beyond 1,000 A.U. A second, closer source of comets is now recognized, the Kuiper Belt, at 30-60 A.U.

Of particular interest today is the apparent blurring of the distinctions between asteroids and comets, especially the Kuiper Belt objects. In addition, the reality of the Oort Cloud itself is being questioned. Also of interest is the role of comets as transporters of life forms throughout the universe.

ACB ORBITAL ANOMALIES OF COMETS

ACB1 The Appearance of Comets in Cycles (Claims of 19½, 11, years, etc.)

ACB2 Nonrandom Direction-of-Approach of Comets to the Sun

ACB3 New Comets Have Almost-Critical Velocities (i.e.; almost extra-solar) [ACB8]

ACB4 Sun-Grazing Comets: The Kreutz Group

ACB5 Changing Cometary Periods (e.g.; Halley, Encke)

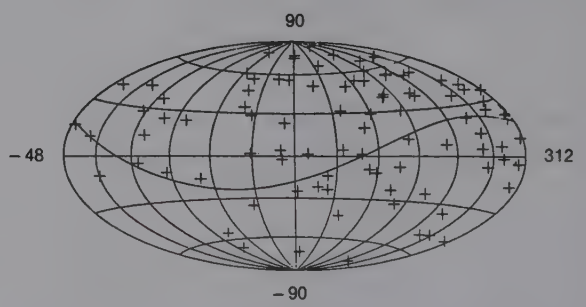
ACB6 Jupiter's Family of Comets

ACB7 Low-Eccentricity Cometary Orbits (How were these established if they came from the Oort Cloud?)

ACB8 The Scarcity of Hyperbolic Orbits (i.e.; interstellar comets) [ACB3]

ACB9 Cometary Groups (i.e.; they have similar orbital characteristics)

ACB10 Orbits of New Comets Diverge from Common Point (What is located at this point?)



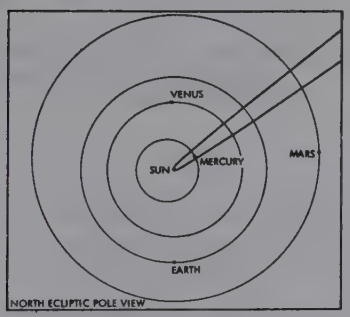
Directions of closest approach to the sun for new comets, illustrating the 7:3 east-west hemispherical bias. (Mercury, 11: 189, 1982.) [ACB2]

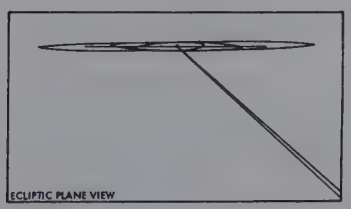
ACB11 Excess of Retrograde Long-Period Comets

ACB12 Trans-Neptune Region Also Recognized as a Comet Source (This is now designated as the Kuiper Belt, but what was its origin?)

ACB13 Cometary Perturbations Suggestive of Planet X [AXO]

ACB14 Predicted Rapid Attrition of the Hypothetical Oort Cloud by Molecular Clouds
ACB15 Dynamical Improbability of the Oort Cloud
ACBa Doubts about the Existence of the Oort Cloud of Comets [ACEe, ACOe]
ACBb Chaotic Cometary Orbits
ACBc Possible Perturbations of the Oort Cloud
ACBd Sources of Cometary Spins Unknown
ACBe Chiron's Rapid Evolution (Now considered an asteroid.)
ACBf Unexplained Clustering of Cometary Aphelia
ACBg Unbound (Interstellar) Comets Are Usually Retrograde [ACB8]
ACBh Comet Encounters with Earth
h.1 Historical Passsages through Cometary Tails and Resulting Phenomena
h.2 Supposed Collisions of Earth with Comets (e.g., 1908 Tunguska Event)
ACBi Objects with Comet-Like Tails in Asteroid Belt (Once again a blurring of the distinction between asteroids and comets.)





Sun-grazing comets, such as 1979 X1, often have high inclinations.

ACE THE GEOLOGY OF COMETS

ACEa Comet Fragility Suggests That Some Are Rubble Piles
ACEb Unknown Origin of Organic Coatings and Dust on Comets
ACEc Cometary Dust of Anomalous Composition
ACEd Other Observations Suggesting Rubble Piles (e.g.; very low densities)

ACF ELECTROMAGNETIC EMISSIONS FROM COMETS

ACFa Low-Activity Comets Are Intrinsically Different [ACFi]
ACFb Infrared Spectra Reveal Anomalous Carbon Isotopes on Some Comets
ACFc Comets Emit Cyanogen Jets [ACOa]
ACFd Carbon-Poor Comets (Why are they so different? (e.g.; comet Yanaka, 1988r)
ACFe Unexplained X-Ray Emissions from Comets
ACFf Lyman-Alpha Radiation Suggests a Population of Icy Cometesimals (This is contested by some)
ACFg Ethane and Methane Detected in Some Comets (Origin of these gases?)
ACFh Cometary Spectra Suggest the Presence of Organics (Possibly Bacteria) in Comets (Comets might be agents of panspermia.)
ACFi Comets with Radically Different Compositions Suggesting Sources Other Than the Oort Cloud (e.g.; comet Yanaka) [ACFa, ACFd]

ACL COMETS WITH SATELLITES

ACLa Comets with Satellites [AAL]
ACLb Claim of Strange Object Following Hale-Bopp

ACO VISUAL OBSERVATIONS OF COMETS

ACO1 Two-Dimensional Comet Tails

ACO2 Cometary Activity Far from Solar Influence (e.g.; Halley, 1985)
ACO3 Comets without Nuclei (e.g.; Comet 1887I)
ACO4 Absence of Meteorites from Comet-Related Meteor Showers
ACO5 Contraction of Cometary Comas as the Sun is Approached
ACO6 Unexplained Abundance of Short-Period Comets
ACO7 Persistence of Long-Period Comets Despite Attrition from Molecular Clouds
ACO8 Seriality of Cometary Apparitions (e.g.; the 1930-1932 cluster)
ACO9 Comets with Multiple Tails and Antitails (e.g.; Comet 1953g)
ACO10 Ejection of Spherical Halos (e.g.; Comet Donati, 1858)

Drawings of comet Coggia of 1874 showing its ejection of spherical halos. (Scientific American, 30:34, 1874) [ACO10]

ACO11 Correlation of Terrestrial Auroras and the Luminous Phenomena of Distant Comets
ACO12 Blinking Comets (e.g.; Halley. 1984-1985)
ACO13 The Anomalous Disappearance of Comets (e.g.; periodic Comet Biela)
ACO14 Anomalous Brightening of Short-Period Comets
ACO15 Comet Reflectivities Are Similar to Those of Asteroids
ACO16 Some Cometary Light Curves Resemble Those of Asteroids
ACO17 New Comets Exhibit Different Brightening Behavior Than Old Comets
ACO18 Anomalous Splitting of Comets
ACO19 Tail-Wagging Comets (e.g.; Comet Burnham, 1960)
ACO20 Cometary Outbursts (i.e.; sudden increases in brightness, peaking in a few days, then declining)
ACO21 Comet Attrition Rates Imply Youth
ACO22 No Ices in Cometary Reflection Spectra
ACO23 The Blackness of Cometary Nuclei
ACOa Origin of Cometary Jets
ACOb Comets with Highly Irregular Shapes
ACOc Unexplained Rapid Development of Kinked Tails
ACOd Infrared Tails of Some Comets
ACOe Mysterious Origin of Comets [ACBa, ACEe]
ACOf Giant Comets (e.g.; object Varuna) [AX]
ACOg Very Tiny Comets (See GWCc for the icy minicomet controversy.)

ACR RADAR OBSERVATIONS OF COMETS

ACRa Radar Suggests Comets Are Rubble Piles

ACX OCCULTATIONS BY COMETS

ACX1 Cometary Tails and the Anomalous Occultations of Radio Stars

AD INTERSTELLAR CLOUDS

ADF SPECTROSCOPIC OBSERVATIONS
ADO VISUAL OBSERVATIONS OF INTERSTELLAR CLOUDS

ADF SPECTROSCOPIC OBSERVATIONS

ADFa Clouds of Complex Organic Molecules, Possibly Including Bacteria

ADO VISUAL OBSERVATIONS OF INTERSTELLAR CLOUDS

ADOa Origin and Nature of High Velocity Clouds (HVCs)

AE ENIGMATIC OBJECTS[7]

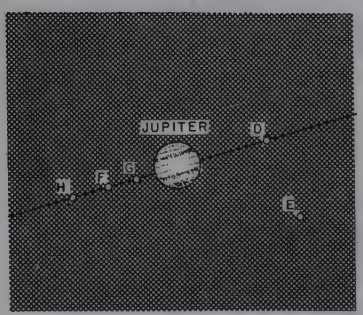
AEB CELESTIAL MECHANICS PROBLEMS SUGGESTING THE EXISTENCE OF UNRECOGNIZED OBJECTS
AEO BRIGHT ENIGMATIC OBJECTS
AEX UNIDENTIFIED OBJECTS TRANSITING THE SUN, MOON, AND PLANETS

AEB CELESTIAL MECHANICS PROBLEMS SUGGESTING THE EXISTENCE OF UNRECOGNIZED OBJECTS

AEBa Anomalous Perturbations of Space Probes

AEO BRIGHT ENIGMATIC OBJECTS

AEO1 Bright Objects near the Sun (e.g.; September 20, 1896)
AEO2 Starlike Objects with Anomalous Motions (e.g.; Huth's moving star, 1801)
AEO3 Unexplained Nebulous Objects (i.e.; hazy objects that cannot be classified as meteors or comets due to motion and/



March 30, 1612, C. Scheiner observed an enigmatic object (E) near Jupiter. D, F, G, and H are the Galilean Satellites. (Sky & Telescope, 42:344, 1971) [AEO2]

or behavior)

AEOa Explosions of Small Spacewatch Objects in Atmosphere

AEX UNIDENTIFIED OBJECTS TRANSITING THE SUN, MOON, AND PLANETS

AEX1 Objects Crossing the Face of the Sun (scores these have been recorded)

AEX2 Objects Crossing the Moon's Disk (e.g.; small black object, November 23, 1920; nowadays artificial satellites are sometimes seen)

AEX3 Unidentified Objects Transiting Jupiter

January 14, 1983, The arrow marks the path taken across the sun by a black spot. (Royal Astronomical Society of Canada, National Newsletter, 77:L19, 1983) [AEX1]

AF UNBOUND OBJECTS

AFO OBSERVATIONS OF "FLOATERS"

AFO OBSERVATIONS OF "FLOATERS"

AFOa Isolated, Planetary-Mass Objects (Called "floaters" or "drifters.")

AG THE EARTH[6]

AGB ANOMALIES IN THE EARTH'S ROTATION
AGL ARTIFICIAL-EARTH-SATELLITE PHENOMENA
AGO OBSERVATIONS OF EARTH FROM SPACE

The earth itself is an astronomical object only for astronauts. Nevertheless, we can make a few useful astronomical observations from the earth's surface. For example, the well-known Chandler Wobble (still not completely explained) was detected by the sightings of fixed stars. A subject of special interest here is the possible existence of natural earth satellites--other than the moon---and natural debris clouds in orbit around the earth.

For geological anomalies, see Chapter E.

AGB ANOMALIES IN THE EARTH'S ROTATION

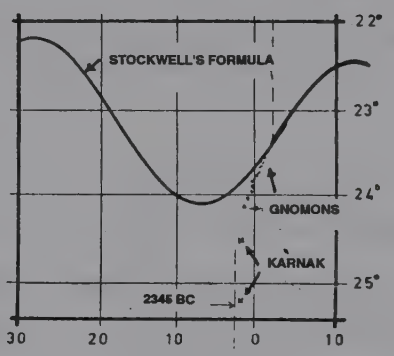
AGB1 Unexplained Variations in Latitude Measurements (The source of the Chandler Wobble is still uncertain.)

AGBa Unexplained Slow Changes in Earth's Rotation

AGBb Origin of Earth's Spin (In fact, the source of the spins of all the planets in a mystery.)

AGBc Theories of Earth Flipping or Spin Reversal

AGBd Possible Catastrophic Changes in Spin as Implied by Geological Record (See ESM for anomalous deposits of superficial debris.)



Earth's tilt angle versus millennia as inferred from ancient megalithic alignments. A fairly recent axial shift is implied. But the reliability of this type of archeological data is suspect. (Pamphlet by M. Bowden, 1983) [AGBd]

AGL ARTIFICIAL-EARTH-SATELLITE PHENOMENA

AGL1 Slow Changes in Artificial Satellite Inclinations

AGL2 Sudden Perturbations of Orbital Elements of Artificial Satellites

AGL3 Slow, Unexplained Descent of Satellites (e.g.; Lageos)

AGL4 Claims of Direct Visual Observations of Natural Earth Satellites

AGL5 Radio Propagation Anomalies Possibly Related to Natural Earth Satellites (i.e.; unexplained signal enhancements.)

AGL6 Correlation of Geophysical Events with Perigee Passages of Natural Earth Satellites

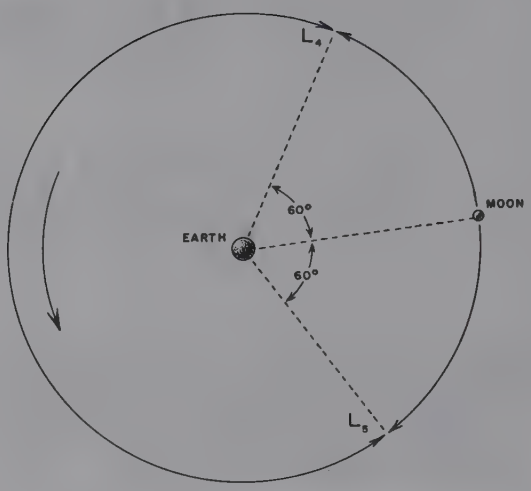
AGLa Possible Earth Debris-Rings: Past and Future

AGLb Claims of Radar Detection of Natural Earth Satellites

AGLc Earth's Lagrangian Companions (i.e.; natural objects at the Lagrangian points)

AGO OBSERVATIONS OF EARTH FROM SPACE

AGO1 Unexplained Periodic Changes in Earth's Brightness Seen from Orbit



Possible clouds of debris in satellite orbit have been observed at the earth's Lagrangian points L_4 and L_5. (Sky & Telescope, 22:10 and 22, 1961.) [AGL4]

AH MERCURY[6]

AHB MERCURY'S ORBITAL AND SPIN ANOMALIES
AHE GEOLOGY AND FIGURE OF MERCURY
AHF MERCURY'S INTRINSIC RADIATION SOURCES
AHO ANOMALOUS TELESCOPIC OBSERVATIONS OF MERCURY
AHR RADAR OBSERVATIONS OF MERCURY
AHX ANOMALIES OBSERVED DURING TRANSITS OF MERCURY
AHZ MERCURY'S ANOMALOUS MAGNETIC FIELD

Mercury is an unusual planet in many respects. Its small size and heavily cratered surface give it a moon-like appearance. Yet, its high density (5.44) differs substantially from the moon's (3.34). It is more like the earth's (5.53). Mercury's orbit is highly eccentric and inclined, suggestive of past encounters of some sort. The advance of Mercury's perihelion can be explained by General Relativity but also in other reasonable ways, so it must be included here. One of the greatest surprises proffered by this planet is its apparent dynamo-generated magnetic field. One would expect any metallic core would have solidified long ago given Mercury's small size.

AHB MERCURY'S ORBITAL AND SPIN ANOMALIES

AHB1 The Residual Advance of Mercury's Perihelion [CRGh, AVB2]
AHB2 Mercury's Anomalously High Eccentricity and Inclination (These parameters may have derived from past capture or encounters.)
AHB3 Anomalously Short Transit Times across the Sun
AHB4 Mercury's Spin Resonance (It's spin period is 2/3 its sidereal year. In the resonance-rich solar system, this cannot be considered anomalous.)
AHBa Orbital Instability and Possible Future Ejection from the Solar System (Several of the smaller planets are candidates.)
AHBb Mercury as an Escaped Moon from Venus

AHE GEOLOGY AND FIGURE OF MERCURY

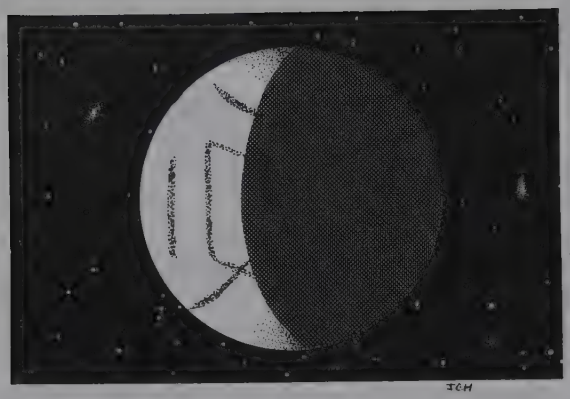
AHE1 The Asymmetry of Mercury's Topography (e.g.; large impact basins on one side only)
AHE2 Mercury's Possible Prolate Shape
AHE3 Swirl Markings (up to 50 kilometers across) [ALE5]
AHEa Anomalously High Density and Iron Content
AHEb Unknown Origin of Long, High Cliffs
AHEc Basalt-Free Surface Implies Retained Heat and Geodynamo [AHZ1]

AHF MERCURY'S INTRINSIC RADIATION SOURCES

AHF1 Unexplained Extreme-Ultraviolet Emissions from Mercury

AHO ANOMALOUS TELESCOPIC OBSERVATIONS

AHO1 Mercury's Occasional Blunted Cusps
AHO2 Terminator Irregularities (e.g.; curious bulges and cavities)
AHO3 White Projections and Spots
AHO4 Dark Linear Markings (e.g.; long streaks, often inter-



Dark linear markings on Mercury as seen by P. Lowell. (Knowledge, 4:228, 1907.) [AHO4] Similar spoke-like markings have been observed on Venus. [AVO6]

secting in knot-like spots. Observed by Lowell, Mercury's streaks are not unlike the "canals" of Mars.)

AHO5 Anomalous Brightness Temperatures

AHO6 Ring of Light around Mercury's Dark Side [ALO9]

AHOa Reflection Spectra Reveal Sodium in Atmosphere from Unknown Source

AHOb Existence of "Deep" Hot Spots (Located near the equator, they could be due to internal heat or reradiated solar energy.) [AHZ1]

AHR RADAR OBSERVATIONS OF MERCURY

AHRa Radar Signals Suggest Ice in Sun-Sheltered Spots

AHX ANOMALIES OBSERVED DURING TRANSITS

AHX1 Bright Spots on Mercury during Transit

AHX2 Ring around Mercury during Transit [AVX1]

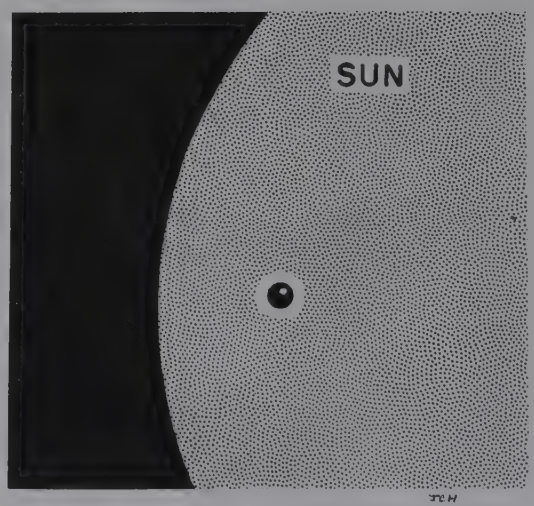
AHX3 Illumination of Mercury's Disk during Transit

AHXa The Black-Drop Effect Seen During Transit (The planet is slow in detaching itself from the sun's bright limb. It is an optical effect and not anomalous.) [AVXa]

AHZ MERCURY'S ANOMALOUS MAGNETIC FIELD

AHZ1 Mercury's Unexpected Magnetic Field (This field implies an internal dynamo and hot, fluid core.) [AHEc, AHOb]

AHZ2 Mercury's Offset Magnetic Field [AJLo, AJZ1, AUZa, EZF1]



Mercury in transit exhibiting a bright halo and off-center white spot. (Royal Astronomical Society, Monthly Notices, 38:337, 1878. [AHX1, AHX2]

AJ JUPITER[6]

AJB JOVIAN ORBITAL ANOMALIES
AJF INTRINSIC RADIATION FROM JUPITER
AJL JUPITER'S REMARKABLE RINGS AND GALILEAN SATELLITES
AJO VISUAL OBSERVATIONS OF JOVIAN ANOMALIES
AJW UNUSUAL ATMOSPHERIC PHENOMENA ON JUPITER
AJX TRANSIT AND OCCULTATION PHENOMENA AT JUPITER
AJZ JUPITER'S CURIOUS MAGNETIC FIELD

The naked eye sees giant Jupiter as a bright jewel in the night sky. With a little optical help, the four large Galilean moons look like bright planets circling a miniature sun. It is a planet of many mysteries. What is the Great Red Spot? What is the source of the planet's internal energy? Why is its magnetic field tilted to the axis of rotation? Several century-old "telescopic" anomalies remain unresolved, such as the appearance of double shadows during the transits of the Galilean satellites.

AJB JOVIAN ORBITAL ANOMALIES

AJB1 Cyclic Disturbances of Jupiter's Orbit (Its position has 12.4-year period.)

AJF INTRINSIC RADIATION FROM JUPITER

AJF1 Jupiter's Intrinsic Energy Radiation (An internal heat source implied)
AJF2 Variations in Jupiter's Decametric Radiation (Correlated with positions of the Galilean satellites.)
AJFa 1983 Unexplained Flash on Jupiter

AJL JUPITER'S REMARKABLE RINGS AND GALILEAN SATELLITES

AJL1 Pre-Voyager Sightings of Jupiter's Ring
AJL2 Io's Bizarre Physical Makeup (e.g.; sodium clouds)
AJL3 Io's Anomalously Energetic Volcanos
AJL4 Ganymede's Grooved Terrain
AJL5 Europa's Lineaments [AJLi]
AJL6 Temporary Disappearance of Ganymede (i.e.; December 1, 1915)
AJLa Jupiter's Second Ring
AJLb Jupiter's Dust Cloud
AJLc Long, Bright Streak on Amalthea
AJLd Io's Heat Flow and Glow
AJLe Io's Magnetic Field
AJLf Prometheus-Type Plumes on Io
AJLg Bizarre Radar Returns from the Galilean Satellites
AJLh Io-Jupiter Electrical Link
AJLi Grooves and Lineaments on Galilean Satellites [AJL5]
AJLj Origin of Callisto's Magnetic Field Unknown
AJLk Ganymede's Magnetic Field [AJL5, AJLe, AJLj]
AJLl Possible Oceans on Some Galilean Satellites
AJLm Europa's Purported Bioenergy Source
AJLn Unknown Source of Europa's Internal Energy
AJLo Europa's Tilted Magnetic Field [AJZ1]
AJLp Chaotic Motion of Galilean Satellites
AJLq Callisto's Lack of Small Craters
AJLr Crater Chains on Ganymede and Callisto

AJO VISUAL OBSERVATIONS OF JOVIAN ANOMALIES

AJOa Unpredicted Shoemaker-Levy Impact Phenomena (e.g.; fragment sizes, atmospheric composition, etc.)
AJOb Curious Impact Events Seen on Jupiter's Nightside

AJW UNUSUAL ATMOSPHERIC PHENOMENA ON JUPITER

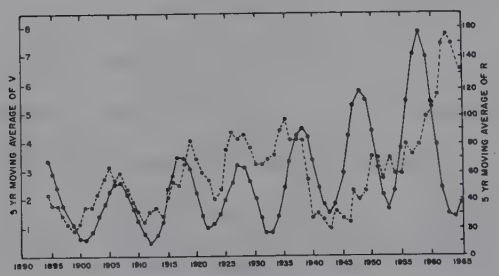
AJW1 Periodicities of Jovian Atmospheric Features (e.g.; Red Spot brightness and motion)
AJWa 2000-Mile-Long Black Spot
AJWb Atmospheric Composition Unlike That of Comets
AJWc Jupiter as a Parched Planet

AJX TRANSIT AND OCCULTATION PHENOMENA

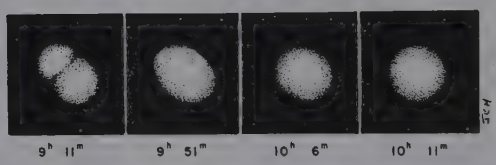
AJX1 Distorted Shapes of Galilean Satellites in Transit
AJX2 Hot Satellite Shadows on Jupiter
AJX3 Dark Transits of Galilean Satellites
AJX4 Double Shadows of Io
AJX5 Limb Phenomena during Occultations and Transits (e.g.; satellites seem to hang on Jupiter's limb)
AJX6 Post-Eclipse Brightening of Io
AJX7 Discrepancies in Predictions of of Eclipses and Transits

AJZ JUPITER'S CURIOUS MAGNETIC FIELD

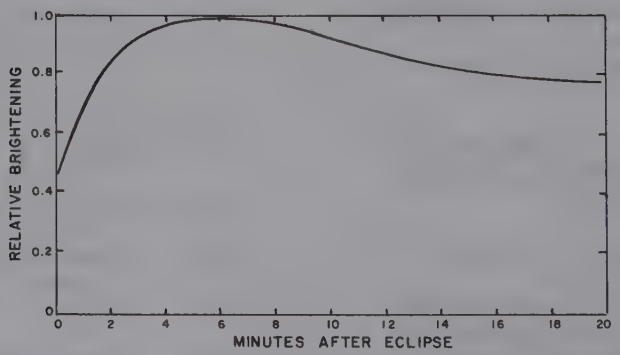
AJZ1 Offset Magnetic Field (Its offset is about 30,000 miles.) [AHZ2, AJLo, AUZa, EZF1]



Sunspot numbers (solid line) versus Red Spot prominence (dashed line). (Nature, 222:69, 1969.) [AJW1]



Ganymede's distorted shapes during the transit of April 17, 1896. (British Astronomical Association, Journal, 9:86, 1898.) [AJX1]



Typical post-eclipse brightening curve of Io after emerging from Jupiter's shadow. (Science, 203:643, 1979.) [AJX6]

AL THE MOON[6]

ALB THE MOON'S ORBITAL ANOMALIES
ALE SOME ENIGMAS OF LUNAR GEOLOGY
ALF LUNAR LUMINOUS PHENOMENA
ALL THE MOTION OF LUNAR SATELLITES
ALO ANOMALOUS TELESCOPIC AND VISUAL OBSERVATIONS
ALW LUNAR "WEATHER"
ALX LUNAR ECLIPSE AND OCCULTATION PHENOMENA
ALZ THE ENIGMAS OF LUNAR MAGNETISM

Down the centuries. astronomers have lavished more effort on the moon than any other astronomical object. More recently, astronauts have explored the lunar surface and returned with geological samples. We therefore know a lot about our nearest companion in space. This long, close scrutiny has uncovered a wide array of lunar anomalies and curiosities.

One class of anomalous phenomena involves the play of sunlight on the moon's surface features. Astronomers have detected variable spots and streaks on the surface. In addition, there are hundreds of observations of so-called transient lunar phenomena (TLPs), such as gentle glows and bright points of light.

Lunar eclipses multiply the anomalies. Chief among these is the frequent hanging or projection of a star or planet on the edge of the moon during its occultation. Even radio signals from spacecraft well behind the moon reach the earth.

A major Space-Age enigma is the discovery of patchy magnetic fields on the lunar surface ("magcons") and remanent magnetism in the lunar samples returned to earth. Artificial satellites of the moon have also detected the presence of strange mass concentrations ("mascons") and, in sheltered spots, even ice.

ALB THE MOON'S ORBITAL ANOMALIES

ALB1 Earth-Moon Intrinsic Instability
ALB2 Discrepancies in the Moon's Ephemeris [ALB3, ALB6]
ALB3 Nongravitational Forces and Earth-Moon Acceleration Discrepancies (There is a discordance in the rate of the moon's recession and that attributable to tidal action.) [ALBb]
ALB4 Claim That the Earth-Moon Acceleration Is Incompatible with the Moon's Origin in Earth Orbit
ALBa Collision Hypothesis Leaves Earth-Moon System Spinning Too Rapidly
ALBb Anomalously High Tidal Dissipation [ALB3]

ALE SOME ENIGMAS OF LUNAR GEOLOGY

ALE1 Asymmetrical Distribution of Maria and Large Basins
ALE2 Origin and Nature of the Sinuous Rilles and Formations Resembling Terrestrial Water-Formed Features
ALE3 The Lunar Rays (The rays stretch for hundreds of miles. The mechanism of their formation remains controversial.)
ALE4 Lunar Features Seemingly Shaped by Ice (e.g.; apparent moraines, pingos, shrinkage features)
ALE5 Swirl Markings (10-50 kilometers wide and associated with magnetic anomalies.)
ALE6 Anomalous Red Formations

ALE7 Layered Structures (The separation planes vary from inches to thousands of feet.)

ALE8 Lunar Glasses (e.g.; glassy veneers on some soil and rocks)

ALE9 Nonrandom Distribution of Lunar Craters

ALE10 Unexplained Minor Surface Features (e.g.; D-shaped feature in Apennine Mts.)

ALE11 Large-Scale Asymmetries in in Composition of the Lunar Surface

ALE12 Dark-Haloed Lunar Craters (Their origin is controversial.)

ALE13 Local Concentrations of Radioactivity ("Radcons")

ALE14 Scarcity of Dust and Meteoric Material (When compared to the known influx on earth.)

ALE15 Anomalously Young Lunar-Surface Exposure Ages (i.e.; a million years or less)

ALE16 Local Concentration of Volatiles (e.g.; typically potassium, water, rubidium)

ALE17 Some Lunar Soils Older Than Associated Rocks

ALE18 Problems in Dating Lunar Rocks and Soils (Different methods produce different ages. These discrepancies will doubtless be ironed out in the future.)

ALE19 Compositional Differences between Earth and Moon (The moon depleted in volatiles, enhanced in refractory materials.)

ALE20 Apparently Anomalous Long-Term Persistence of Craters (This despite billions of years of bombardment by space debris.)

ALE21 Alignment of Mascons and Lunar Moments of Inertia

ALE22 Geological Changes within Historical Times (e.g.; topography around Linne)

ALEa Lunar Crust Thicker on Far Side

ALEb Moon's Interior May Still Be Molten (According to data from Clementine lunar satellite.)

ALEc Chemical Anomalies and Theories of Lunar Origin

ALEd Flaws in the Impact Theory of Lunar Origin

ALEe Strange Stickiness of Lunar Dust (An electrostatic effect?)

ALEf Lunar Density Anomalously Low for a Collision Origin

ALEg Presence of Lunar Ice in Sheltered Spots (Not considered anomalous.) [ALFb, AMEm]

ALEh Crater Linne's Vanishing Trick

ALEi The Great Straight Wall (Often claimed to be artificial, but here considered a geological feature.) [ALOd]

ALEj Meandering Furrows

ALEk Water-Vapor Surges

ALEl Paradoxical Boulders (The origin of many of these extraneous boulders remains enigmatic.)

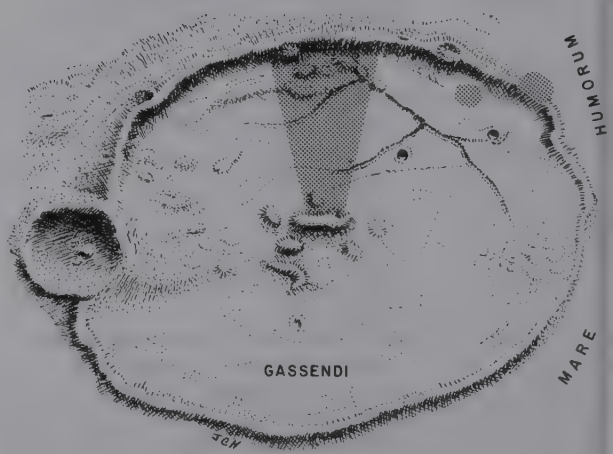
ALF LUNAR LUMINOUS PHENOMENA

ALF1 Infrared Anomalies (e.g.; spots that are brighter than surroundings)

ALF2 Lunar Catastrophism within Historical Times (Record of a lunar phenomenon on July 18, 1178 that is sometimes claimed to have been the creation of crater.)

ALF3 Transient Points of Light (Called TLPs for "Transient Lunar Phenomena.") [ALF4-ALFa, ALO2, ALW1, ALXc, AMF1]

ALF4 Localized Color Phenomena (e.g.; transient glowing spots---more TLPs) [ALF3, ALF5-ALFa, ALO2. ALW1]



A TLP at crater Gassendi, April 30, 1966. The shaded areas mark color phenomena. (Science, 155:449, 1967.) [ALF4]

ALF5 Transient, Large-Area Luminescence (These glowing areas may encompass tens of thousands of square miles.) (TLPs)

ALF6 Lightning-Like Phenomena on the Moon (TLPs)

ALFa Transient Lunar Phenomena (TLPs) Due to Meteor Impacts Observed from Spacecraft

ALFb Neutron Spectra Suggest the Presence of Ice [ALEg]

ALL THE MOTION OF LUNAR SATELLITES

ALL1 Perturbations of Artificial Lunar Satellites (The perterbations are attributed to concentrations of mass called "mascons.")

ALO ANOMALOUS TELESCOPIC AND VISUAL OBSERVATIONS

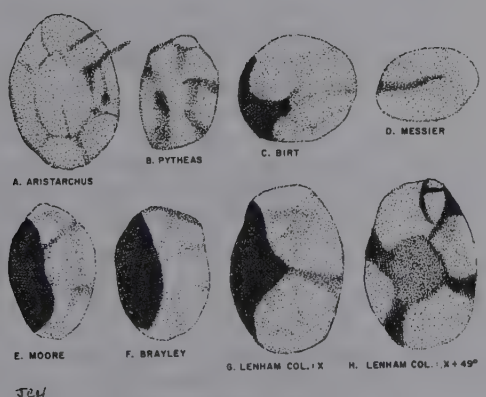
ALO1 Doubling of Lunar Detail

ALO2 Variable Spots, Streaks, and Other (Apparently) Optical Phenomena [ALF3-ALFa, ALW1]

ALO3 Banded Craters (Craters with dark streaks on their floors.)

ALO4 Lunar "Canals" and Lineaments [AMO1]

ALO5 The Lunar Zodiacal Light



Sketches of several types of banded craters. (British Astronomical Association, Journal, 73:33, 1963.) [ALO3]

ALO6 Distortions of the Lunar Disk (e.g.; notches, projections, departures from circularity)

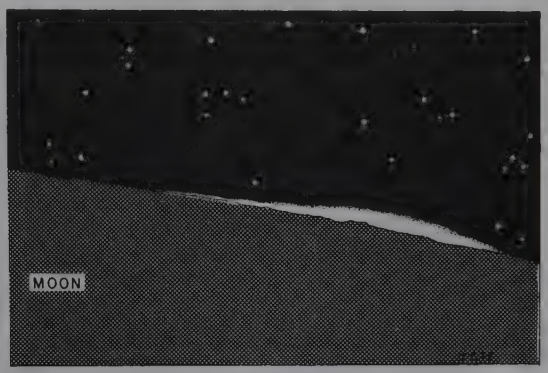
ALO7 Bright Diverging Ray above the Moon

ALO8 Dark Triangular Patches under the Moon

ALO9 Ring of Light around the New Moon [ALX6, AVO2]

ALO10 Shortened Lunar Crescents

ALO11 The Lunar Post-Sunset Horizon Glow



Lunar post-sunset glow as seen by the Surveyor spacecraft about 15 minutes after sunset. (The Moon, 10:121, 1974.) [ALO11]

ALOa "Fast-Moving" Visible Phenomena of Indeterminate Nature (Called FMOs for "Fast Moving Spots.")

ALOb Waltemath's "Moon" (An old claim that a second moon of very low reflective power exists.)

ALOc Unusual Brightness of Some Full Moons

ALOd Claims of Artificial Formations on the Moon (e.g.; cities, walls) [ALEi, AMOa]

ALOe Areas Suggesting Vegetation by Virtue of Their Color and Texture

ALW LUNAR "WEATHER"

ALW1 Clouds, Mists, and Obscurations (These are also lumped with TLPs.) [ALF3-ALFa, ALO2]

ALW2 Anomalous Ion Clouds Detected on the Lunar Surface

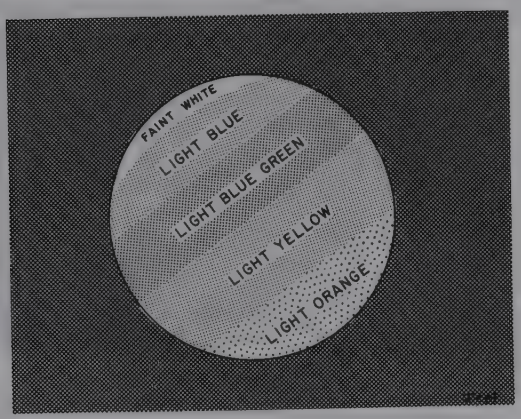
ALX LUNAR ECLIPSE AND OCCULTATION PHENOMENA

ALX1 Very Dark Lunar Eclipses (e.g.; June 25, 1964)

ALX2 Distortions of the Earth's Shadow on Moon

ALX3 Eclipse Fingers of Light (i.e.; as seen on moon's shadowed surface)

ALX4 Bands and Patches on the Eclipsed Moon



Colored bands of light on the eclipsed moon; January 29, 1953. (Marine Observer, 24:16, 1954.) [ALX4]

ALX5 Very Bright Lunar Eclipses (e.g.; October 18, 1967)

ALX6 Thin Arcs of Light on Rim of Eclipsed Moon [ALO9, ALX10, ALXb]

ALX7 Dusky Bands across Planets at Contact Phase of Occcultation

ALX8 The Hanging or Projection of Stars and Planets on the Moon's Limb [AVXb]

ALX9 Post-Eclipse Changes of Surface Features (e.g.; often seen around crater Linne)

ALX10 Unexpected Reception of Radio Signals from Occulted Spacecraft [ALX12]

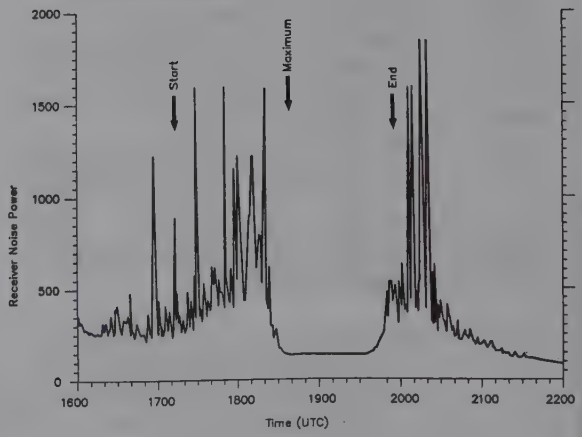
ALX11 Bright Ring around Moon during Partial Solar Eclipse [ALX6]

ALX12 Extended Glows of Occulted Planets (i.e.; glows seen beyond edge of lunar disk) [ALX10]

ALXa Anomalous Changes in the Times of Star Occultations

ALXb Lunar Horizon Glow during Eclipses [ALX6, ALX10]

ALXc TLPs Seen during Eclipses [ALF3-ALFa, ALF4, ALO2, ALW1]



Radio noise power measured on earth during a partial solar eclipse; July 11, 1991. (QST, p. 21, February 1995) [ALX12]

ALXd Eclipse Cuts Off Some Terrestrial Radio Traffic

ALXe Lunar Auroras Seen during Lunar Eclipses

ALZ THE ENIGMAS OF LUNAR MAGNETISM

ALZ1 Anomalous Features of Lunar Magnetism
1.1 Local Magnetic Anomalies (Measured by astronauts.)
1.2 Remanent Magnetism of Lunar Samples

ALZ2 Anomalous Demagnetization Behavior of Lunar Samples (i.e.; nonreproducibility of remanent magnetization)

ALZ3 Correlations of Magnetic Anomalies with Surface Features (Magcons)

ALZ4 Correlated Directions of Magnetization of Lunar Magnetic Anomalies (i.e.; groupings of magnetic vectors)

ALZa Possible Intrinsic Field Shifts Caused by Past Impacts of Lunar Moons

AM MARS[6]

AMB ORBITAL ANOMALIES OF MARS
AME MARTIAN GEOLOGICAL ANOMALIES
AMF LUMINOUS PHENOMENA ON MARS
AML THE STRANGE SATELLITES OF MARS
AMO MARTIAN ANOMALIES SEEN THROUGH TELESCOPES
AMR RADAR ANOMALIES
AMW PUZZLING ATMOSPHERIC PHENOMENA ON MARS
AMZ THE SUPRISING MAGNETIC FIELDS OF MARS

Of all the other planets that circle the sun, we know Mars the best. Centuries of telescopic observations and several spacecraft flybys, orbiters, and landers have amassed considerable knowledge of Martian geology, weather, and magnetic field. However, many perplexities remain: (1) the origin of the fluid (usually assumed to be water) that carved the planet's multitudinous channels and apparent lakeshores; (2) the hemispherical dichotomy (half low and relatively uncratered, half cratered highlands); (3) the source of the curious magnetic stripes; (4) the nature of ridge systems and the Tharsis bulge; and (5) as always, the possibility of past or present life.

AMB ORBITAL ANOMALIES OF MARS

AMBa Chaotic Obliquity of Mars
AMBb Evidence for a Roche-Limit Encounter in Past

AME MARTIAN GEOLOGICAL ANOMALIES

AME1 Origin of the Martian Channels, Fluvial Valleys, and Gullies [AMO1]
AME2 Systems of Lineaments on Mars
AME3 Pyramidal Structures (Some of these are claimed to be artificial.) [AMOa]
AME4 Ice Layering in the North Polar Regions
AME5 The "Searchlight" Areas (i.e.; bright patches with straight or diverging sides)
AME6 Evidence for Surface and Subsurface Ice [AMEd]
AME7 Anomalous Hillocks and Ridges (e.g.; parallel ridges hundreds of kilometers long)
AME8 Martian Surface Asymmetry (Called the "Martian Dichotomy." The southern hemisphere is older, more heavily cratered, and more elevated.) [AMEb]
AME9 The White Rock (The nature of this isolated structure is unknown.)
AME10 Anomalous Frost on the Martian Surface
AME11 Polar Features near the Equator

Viking Orbiter 1 photograph of Martian channels just west of Chryse Planitia. (NASA) [AME1]

AME12 Ice-Cap Melting Correlated with Solar Activity
AME13 Excess of Grazing-Incidence Craters
AME14 Unidentified Biochemically Active Ingredient in Martian Soil and the Possibility of Life (As detected by the Viking lander.)
AME15 Apparent Scarcity of Water-Ice at the Southern Polar Cap (The northern cap is mostly water-ice; the southern, frozen carbon dioxide. Why the difference?)
AME16 Anomalously Wet Areas (e.g.; Solis Lacus area)
AME17 Spectroscopic Evidence Suggestive of Vegetation (Absorption bands resemble those of terrestrial vegetation.) [AMOd]
AME18 Apparent Lack of Extensive Surface Erosion (Martian craters, channels, and other features seem uneroded despite strong winds and dust storms.) [ALE20, AME20]
AME19 Layered Deposits (These could indicate fluvial episodes.) (e.g.; in the Valles Marineris area)
AME20 Evidence for an Episode of Accelerated Crater Obliteration [Conflicts with entry AME18]
AME21 Unexplained Origin of Pedestal Craters and Their Eroded Environs
AME22 Flow-Like Character of Crater Ejecta
AME23 The 10-Kilometer-High Tharsis Bulge (It is 5,000-ilometers in diameter. What could have created it?)
AMEa The Apparent Lack of Carbonates on Mars (Surprising in view of the CO_2 atmosphere!)
AMEb Southern Hemisphere More Heavily Cratered Than the Northern [AME8]
AMEc Deposits Indicate Extreme Polar Wandering (These suggesting past magnetic reversals.)
AMEd Glacial Scars and Deposits; Martian Ice Ages? [AME6]
AMEe Evidence for Ancient Oceans and Lakes (e.g.; shorelines)
AMEf Speculations Concerning Endolithic ("Crevicular") Life (i.e.; microorganisms inhabiting crevices and pores in rocks)
AMEg Evidence for Volcanic Releases of Water
AMEh Evidence for Plate Tectonics
AMEi Speculations on Methods of Terraforming Mars (i.e.; making it earth-like for human habitation)
AMEj Evidence for Existing Subterranean Water Reservoirs (Based upon the current deuterium-enriched atmosphere.)
AMEk Gaia-Like Activity on Mars (The development of life on Mars might account for its CO_2 atmosphere.)
AMEl Potential Signatures of Martian Life (In the spectra of biominerals.) [AME17, AMOd]
AMEm Presence of Ice in Craters [ALEg]
AMEn Origin of the Highland Ring-Furrows
AMEo Evidence of Giant Mud Flows
AMEp Possibility of Earth Rocks and Biota on Mars (Since Martian and lunar meteorites are found on earth, earth-born meteorites should exist on other planets.)
AMEq Martian Water Is Deuterium-Enriched (Why?)
AMEr Polygonal Land Forms (These resemble terrestrial patterned ground.) [ETB1]
AMEs Abundance of Pebbles That Seem Water-Worn
AMEt Evidence for Existence of an Iron Core
AMEu Evidence for Very Recent Volcanism
AMEv So-Called "Tornado Tracks" (Attributed to violent dust whirlwinds.) [AMW3]
AMEw Evidence for Strong Aeolian Erosion
AMEx Anomalous Large Areas of Olivine
AMEy Evidence The Mars Was Sculpted by gaseous CO_2 Rather Than Water

AMF LUMINOUS PHENOMENA ON MARS

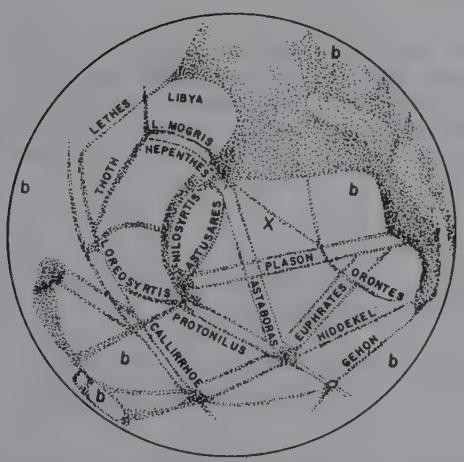
AMF1 Flares and Light Flashes [ALF3]

AML THE STRANGE SATELLITES OF MARS

AML1 Possible Early Sightings of the Martian Satellites
AML2 The Grooves of Phobos
AML3 The Anomalous Acceleration of Phobos
AMLa Mystery Object Reported near Phobos (March 1989, in photo taken by Russian spacecraft.)
AMLb Controversial Origin of the Two Martian Moons

AMO MARTIAN ANOMALIES SEEN THROUGH TELESCOPES

AMO1 The Historic Martian Canals (Earth telescope users still occasionally see and photograph curious lines.) [AME1]
AMO2 Pre-Mariner Observations of Martian Craters
AMO3 The Springtime Wave of Darkness
AMO4 Transitory Dark Spots
AMOa Possible Artificial Structures [ALOd, AME3, XZZn]
AMOb Grid-Like Patterns Appearing on the Planet's Surface
AMOc Moving Surface-Shadows
AMOd Forest-Like Regions [AME17]



A drawing of some Martian lineaments ("canals") made by G.V. Schiaparelli in 1888. (Sidereal Messenger, 8:13, 1889.) [AMO1]

Peculiar Martian terrain dubbed "ghost forests." (Discover, 22:18, November 2001.) [AMOd]

AMOe Windblown Dark Deposits (Possibly indicating recent volcanism.)
AMOf Sudden Permanent Bright Spot (Possible landslide exposing bright surface?)

AMR RADAR ANOMALIES

AMRa The "Stealth Region"; (No radar returns possibly due to high surface absorption.)

AMW PUZZLING ATMOSPHERIC PHENOMENA ON MARS

AMW1 Bright Spots during Planet-Wide Dust Storms
AMW2 Moving Dark Lines (These may be 1,000 miles long.)
AMW3 Vertical Cloud Columns [AMEv]
AMW4 Unknown Cause of Planet-Wide Dust Storms
AMW5 Isotopic Anomalies in the Martian Atmosphere (e.g.; excess nitrogen-15)
AMW6 The Sudden Blue Clearings (Blue-light photos taken by with terrestrial telescopes become clearer.)
AMWa Hypothesized Early Warming of Mars by Clouds
AMWb Rapid Fluctuations in Pressure and Temperature
AMWc Undeciphered Climatic History
AMWd Postulated Early Collapse of

Atmosphere (i.e.; possible impact erosion?)

AMWe Unexplained "Bulges" in Atmosphere

AMZ THE SUPRISING MAGNETIC FIELDS OF MARS

AMZa Localized Magnetic Spots in Crust

AMZb Unexplained Origin of Long Magnetic Stripes

AN NEPTUNE[6]

ANB PROBLEMS WITH NEPTUNE'S ORBIT AND ROTATION
ANF NEPTUNE'S INTRINSIC RADIATION
ANL RING AND SATELLITE IRREGULARITIES
ANO TELESCOPIC ANOMALIES
ANZ NEPTUNE'S ANOMALOUS MAGNETIC FIELD

Neptune is only one-third the diameter of Jupiter and it is much more dense. Like Jupiter and Saturn, Neptune radiates more energy than it receives from the sun, suggesting an internal heat source of some sort. Neptune's magnetic field is tilted some 50° from its axis of rotation, casting doubt upon the dynamo theory of planetary magnetic-field generation. Perhaps most bizarre are the broken arcs of matter circling the planet. Where did they come from?

ANB PROBLEMS WITH NEPTUNE'S ORBIT

ANB1 The Unexplained Large Residual in Neptune's Orbit (Often attributed to Planet X.) [AUB1, AX]

ANBa Evidence for an Origin Closer to the Sun (Evidence comes from celestial mechanics.)

ANBb Neptune's Anomalously Rapid Spin

ANF NEPTUNE'S INTRINSIC RADIATION

ANF1 Measurements of Intrinsic Energy from Neptune

ANL RING AND SATELLITE IRREGULARITIES

ANL1 Disarray among Neptune's Moons (e.g.; Triton is

retrograde, Nereid highly eccentric) [ANLg]

ANL2 Neptune's Elusive Ring and Its Possible Incompleteness

ANLa Triton's Variable Brightness and Plumes

ANLb The Odd Shape of Satellite 1989n1

ANLc The Asymmetry of Triton's Atmosphere

ANLd Galatea's Anomalous Orbital Velocity

ANLe Triton's Craters All on One Hemisphere

ANLf Unknown Nature of Triton's "Cantaloupe" Terrain

ANLg Triton's Retrograde Orbit [ANL1]

ANLh Nereid's Shape Is Highly Irregular

ANO TELESCOPIC ANOMALIES

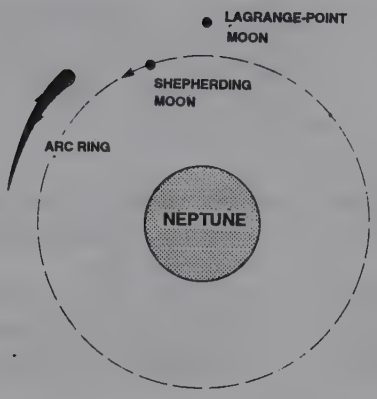
ANO1 Neptune's Variable Brightness

ANOa Neptune's Great Dark Spot

ANOb Transitory Bright Spot in Northern Hemisphere

ANZ NEPTUNE'S ANOMALOUS MAGNETIC FIELD

ANZa Tilted Magnetic Field [AHZ1, AJLo, AJZ1, AUZa, EZF1] AJZa]



Neptune's broken satellite arcs may be shaped by two moons, a so-called "shepherd" moon and another at one of the Lagrangian points. (Science, 230:1150, 1985.) [ANL2]

AO STARS AND EXTENDED LUMINOUS OBJECTS[8]

AOB	STELLAR DYNAMICS AND DISTRIBUTION
AOF	STELLAR ANOMALIES DETECTED THROUGH THEIR RADIATION
AOO	EXTENDED LUMINOUS OBJECTS
AOX	STELLAR-ECLIPSE ANOMALIES
AOZ	MAGNETIC STARS

Stars and extended objects provide a cornucopia of anomalies for our files. Just a few of them are:

- Controverted theories of origin(s) for stars in general
- The mysteries of globular clusters; their origin and motion
- The unexplained ubiquity of double and multiple stars
- The possible, ostensibly impossible, quantization of stellar redshifts
- The ubiquity of jet phenomena
- Challenges to General Relativity
- "Bursters" of several sorts

Many closely related anomalies are treated in sections on quasars (AQ), galaxies (AW), and cosmology-in-general (AT).

AOB STELLAR DYNAMICS AND DISTRIBUTION

AOB1 Star Rings (i.e.; dense elliptical aggregations of about 25-200 stars)

AOB2 Star Streams (i.e.; stream-like motion of similar stars)

AOB3 Expansion of Our Galaxy's Globular-Cluster Population away from Galaxy Center

AOB4 Spherical Distribution of Globular Clusters and Their Apparent Nonparticipation in Galactic Rotation

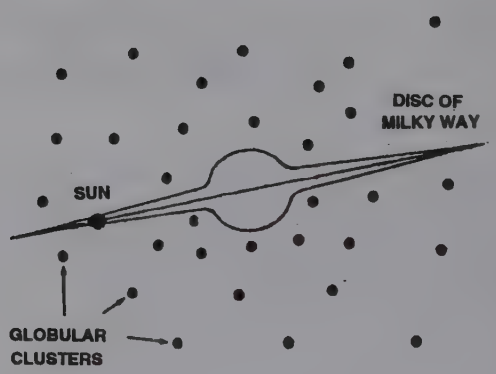
AOB5 Geocentrically Oriented Spectroscopic Binaries

AOB6 Anomalously Slow Rotation of Some Stars

AOB7 The Possible Existence of a Minimum Distance between Stars

AOB8 Existence of a Lower Limit to the Number of Stars in Globular Clusters

AOB9 Globular Clusters That Should Be Collapsing Gravitationally But Are Not



A spherical cloud of globular clusters surrounds the Milky Way. (New Scientist, p. 34, May 13, 1989.) [AOB4]

AOB10 Subdwarfs That Move Counter to Galactic Rotation [AOBd, AWOf]

AOB11 Anomalously High Pulsar Velocities

AOB12 Unexplained Ubiquity of Binary and Multiple-Star Systems

AOB13 Pulsar Formation Rate Exceeds Supernova Frequency (This is a disconnect because pulsars are thought to be born in supernovas.)

AOB14 Dearth of Population-III Stars

AOB15 Curious Distribution of Anomalous Cepheids (They are apparently restricted to spherical dwarf galaxies.)

AOB16 Existence of a Family of Population-I Stars in the Galactic Halo

AOB17 The Unexplained Origin of Globular Clusters

AOB18 The Unexplained Origin of Stars (Really a philosophical consideration.)

AOB19 Apparent Absence of Binaries in Globular Clusters

AOB20 Curious Similar Alignments of the Axes of Young Stars

AOB21 Young Stars with Anomalous Velocities

AOBa "Lonesome" Stars (These are not bound to any galaxy.) [AOBh]

AOBb Missing Postulated Red Dwarfs (i.e.; they should exist but cannot be found)

AOBc "Socket" Stars (Such stars are located in conspicuous voids.)

AOBd Stars Counterrotating in Galaxies [AOB10, AWOf]

AOBe Very Young Globular Clusters [AOF24]

AOBf Wobbling Stars (Suggesting the presence of planets. Not considered anomalous.)

AOBg Evidence for Companion Star of the Sun

AOBh Interstellar Planets: The "Drifters" [AOBa]

AOBi "Runaway" Stars (Designated as "OB Stars," they rush through the galaxy at extreme speed. They were probably propelled by supernovas.)

AOBj Absence of Planets in Globular Clusters

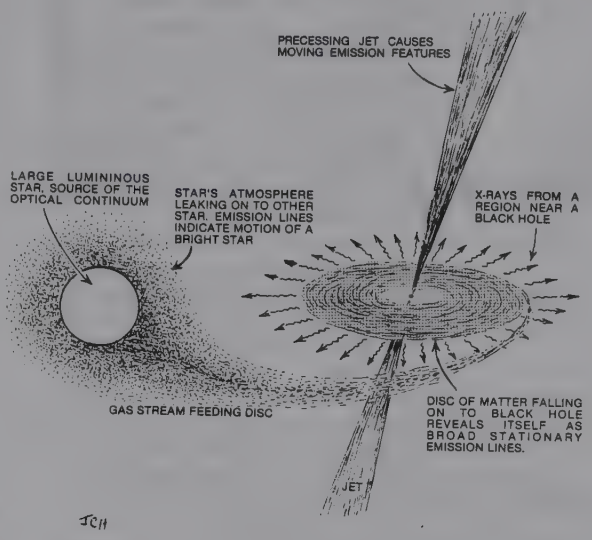
AOBk Superabundance of White Dwarfs

AOF STELLAR ANOMALIES DETECTED THROUGH THEIR RADIATION

AOF1 Star Color Changes in Historical Times (e.g.; Sirius)

AOF2 Anomalous Variable Objects: A Few Extreme Cases (e.g.; SSS 433, V Sagittae) [AOOf]

AOF3 Unidentified Objects at the Core of Our Galaxy


PRECESSING JET CAUSES MOVING EMISSION FEATURES
LARGE LUMININOUS STAR, SOURCE OF THE OPTICAL CONTINUUM
STAR'S ATMOSPHERE LEAKING ON TO OTHER STAR. EMISSION LINES INDICATE MOTION OF A BRIGHT STAR
X-RAYS FROM A REGION NEAR A BLACK HOLE
GAS STREAM FEEDING DISC
DISC OF MATTER FALLING ON TO BLACK HOLE REVEALS ITSELF AS BROAD STATIONARY EMISSION LINES.
JET

One model of the strange star SS 433. (Annual Review of Astronomy and Astrophysics, 22:507, 1984.) [AOF2]

AOF4 Anomalies of Wolf-Rayet Stars (e.g., broad emission lines)

AOF5 Nova and Supernova Anomalies (e.g., repeating novas)

AOF6 Cepheid Anomalies (e.g., double frequencies)

AOF7 Apparent Absence of Bright Carbon Stars

AOF8 The "Missing" Solar Neutrinos and, by Extension, Stellar Neutrino Deficits (Now explained as a result of neutrino oscillations.)

AOF9 Pulsar Anomalies (e.g., sudden changes in period, slow spin-ups, high pulse frequencies)

AOF10 Unidentified Infrared Objects in Our Galaxy

AOF11 Optical Bursters and Flare Stars

AOF12 Flicker Stars (i.e.; stars that vary in brightness on an hourly scale)

AOF13 Supermassive Stars (i.e.; with masses thousands of times that of the sun)

AOF14 Discordant Binaries (e.g.,

cataclysmic binaries)

AOF15 Stars Emitting Excess Infrared Radiation

AOF16 Spinning-Up Stars (i.e.; stars spining faster than both younger and older stars)

AOF17 Observational and Theoretical Objections to the Accepted Hertzsprung-Russell Diagram

AOF18 Discrete Redshifts in Stellar Spectra (i.e.; certain values of redshift are favored)

AOF19 Gamma-Ray Sources Correlated with Solar Oscillations

AOF20 Rapid Variation of Celestial Radio Sources

AOF21 Gamma-Ray Objects (Persistent gamma-ray emitters as opposed to the gamma-ray bursters.) [AOF29]

AOF22 Galactic Sources of Unidentified Radiation (e.g.; radiation producing muon showers in the earth's atmosphere)

AOF23 White-Dwarf Anomalies (e.g., helium-rich dwarfs)

AOF24 Globular-Cluster "Age" Anomalies (Evidence that the globular clusters were not created soon after the Big Bang.) [AOB]

AOF25 Nature of Infrared Bursters

AOF26 Stellar "Age" Anomalies (i.e.; young stars located where theory predicts old stars)

AOF27 Curiously, Smaller White Dwarfs Possess Higher Masses

AOF28 Historical Disappearance of Stars (e.g.; Pleione, the seventh Pleiade)

AOF29 Gamma-Ray Bursters [AOF11, AOF21]

AOF30 X-Ray Bursters

AOFa Cause of Bursts of Star Formation

AOFb Cosmic Masers and Lasers

AOFc Stellar Lithium Deficiency [ASFf]

AOFd The Stellar Age Paradox (Some stars appear to be older than the universe. This paradox may have been resolved.)

AOFe Blue Straggler Stars (These are stars that appear too bright and too blue relative to their main-sequence companions.)

AOFf Anomalously Rapid Stellar Evolution (e.g.; Sakurai's object)

AOFg Origin of the Diffuse Interstellar Bands (Weak, vague absorption patterns in distant stars.)

AOFh Hypernovas (i.e.; souped-up supernovas) [AOF5]

AOFi Nature of Brown Dwarfs

AOFj Black Holes (Too many anomalies to list here.)

AOFk 21-Micrometer Mystery (What causes the strange glow at this wavelength around some red giants?)

AOFl Reported Observations of MACHOS (Massive Compact Halo Objects) (Do they exist? If so, what are they?)

AOFm Cause of the Rapid Disappearance of Stellar-Debris Discs

AOFn Stars with Anomalously High Beryllium Contents

AOFo Einstein Rings (Caused by gravitational lensing. Not considered anomalous now.)

AOFp Stange-Matter Stars [CNX, CPX]

AOFq Embryonic Stars (Just-formed stars. Not anomalous.)

AOFr Red Dwarfs (These rotate rapidly but have no associated magnetic field.) (e.g.; BRI 0021-0214)

AOFs Alien Stars (e.g. stars apparently from other galaxies)

AOFt Heavy-Element Stars (These contain more gold, mercury, and platinum than predicted.)

AOFu Quark Stars (Stars consisting of completely collapsed matter.)

AOFw Galactic-Bulge Objects (Energetic enigmatic objects.)

AOFx Mysterious Radio Pulses (The pulses occur about every 50 milliseconds and are a billion times more powerful than pulsars.)

AOO EXTENDED LUMINOUS OBJECTS

AOO1 X-Ray Rings (e.g.; Cygnus X-ray ring)

AOO2 Nebular Jets (High-velocity jets of matter emitted from diffuse nebular regions rather than stars.)

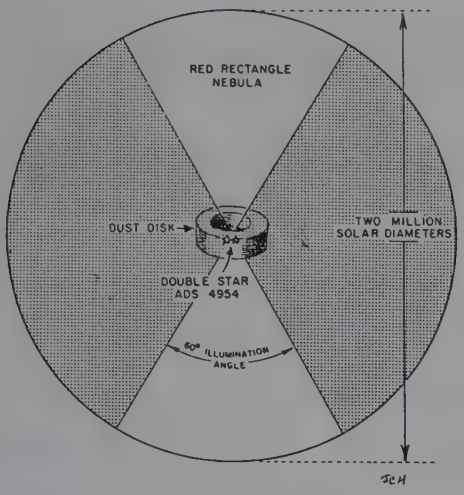
AOO3 The North Polar Radio Spur (It is a spur of enhanced

radio emission rising from the plane of the galaxy.)

AOO4 Triangular Appearance of Stars in Telescopes (Probably due to atmospheric and/or psychological effects.)

AOO5 Puzzling Nature of Bok Globules

AOO6 Jets from Young Stars



An early model of the Red Rectangle. (Natural History, 84:93, November 1973.) [AOO7]

AOO7 The Red Rectangle (A biconical feature of star HD44179.)

AOO8 Herbig-Haro Objects (Small patches of nebulosity with bright emission lines.)

AOO9 Molecular-Cloud Rings [AOOa]

AOO10 Infrared "Cirrus Clouds"

AOO11 Diffuse Cartwheel-Like Structures

AOOa Origin of Interstellar Molecular Clouds [AOO9. AOOb. AOOc]

AOOb High-Velocity ("Ghost") Clouds (e.g.; clumps of hydrogen rushing toward us at 175 kilometers/second from Ursa Major))

AOOc Rotating Gas Clouds (What is the source of spin?)

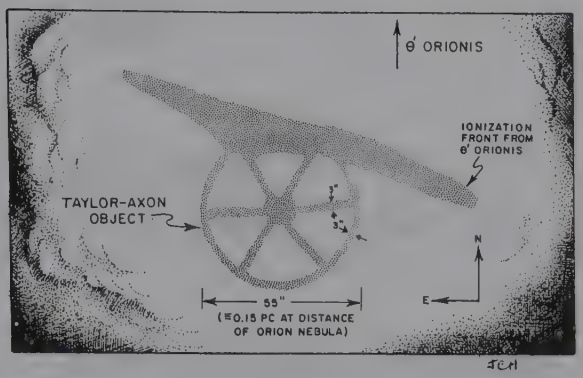
AOOd Egg-Shaped and Oval Stars

AOOe Radio Arcs and Rings

AOOf SS443 Enigma (This star ejects two high-speed jets.)[AOF2]

AOOg Turbulent Nebulae

AOOh Funnel Nebula (Also called a "tornado" nebula from its strange shape.)



A curious cartwheel-like, extended structure silhouetted against a bright nebula. (New Scientist, 83:804, 1979.) [AOO11]

AOOi The Hourglass Nebula (MyCn 18 is named for its shape, which is, so far, unexplained).

AOOj L-Dwarfs, a New Stellar Class (The L-Dwarfs are about the size of Jupiter with temperatures one-third that of the sun.)

AOX STELLAR-ECLIPSE ANOMALIES

AOX1 Anomalous Precession of Eclipsing Binaries (The motion of binary DI Herculis defies relativity. [CRGf])

AOX2 Anomalous Stellar-Eclipse Light Curves

AOX3 Sudden Onsets and Cessations of Stellar Eclipses

AOZ MAGNETIC STARS

AOZa Magnetars (i.e. highly magnetized stars)

AP PLUTO[6]

APB PLUTO'S CURIOUS ORBIT
APL THE INCONGRUOUS SATELLITE OF PLUTO
APW ATMOSPHERIC PHENOMENA ON PLUTO

Pluto orbits at the fringe of the solar system. If it is truly a planet, it possesses the highest eccentricity and inclination of the sun's family of planets. Its only known moon, Charon, is surprisingly large for such a small planet. As with Pluto itself, little is known about Charon.

Early astronomers suspected that Pluto was once a moon of Neptune that escaped. Since the orbits of Pluto and Neptune do cross, this was not an unreasonable thought. Now, though, Pluto is commonly considered to be a Kuiper Belt Object; in other words, just a very large asteroid. It's been demoted!

APB PLUTO'S CURIOUS ORBIT

APBa Pluto's Orbit is Very Eccentric and Highly Inclined (Its orbit is hardly planet-like.)
APBb Pluto-Neptune Resonance
APBc Pluto's Uncertain Origin (Is it really a planet? It may have been a moon of Neptune or a large asteroid.)
APBd Pluto's Orbit is Chaotic

APL THE INCONGRUOUS SATELLITE OF PLUTO

APLa Charon, Pluto's Satellite, Is Relatively Large But of Low Density (It is probably mostly ice.)
APLb Charon's Ice Is Crystalline (Astronomers expected the usual amorphous ice.)

APW ATMOSPHERIC PHENOMENA ON PLUTO

APWa Pluto's Puzzling Temperature Profile (It seems to decrease with altitude.)
APWb Unknown Nature of Pluto's Clouds

AQ QUASARS[8]

AQB QUASAR CLUSTERING AND ASSOCIATIONS WITH GALAXIES
AQF QUASAR ANOMALIES DISCERNED VIA THEIR RADIATION
AQO QUASAR MORPHOLOGY AND COMPONENT DYNAMICS

Quasars (quasi-stellar objects) are star-like in appearance and tend to possess high redshifts. They are incredible energy producers, assuming that their redshifts are true measures of their distances from earth. Since quasar redshifts seem to be quantized, the value of their redshifts as distance indicators is questioned. Some quasars exhibit superluminal velocities. Most but not all quasars are closely associated with galaxies. Their precise nature remains an open question.

AQB QUASAR CLUSTERING AND ASSOCIATIONS WITH GALAXIES

AQB1 The Ubiquitous Quasar-Galaxy Juxtaposition

AQB2 Quasar Pairs Straddling Galaxies (Suggestive of quasar ejection by the galaxy.)

AQB3 Anisotropic Distributions of Galaxies (e.g.; the Local Group of galaxies) [AWB]

AQB4 Apparent Physical Connections between Quasars and Galaxies (Implying that both are at the same distance from earth.)

AQB5 Quasar Alignments (Three or more quasars arranged in approximately straight lines. The quasars may have different red shifts.)

AQB6 Pairs and Clusters of Quasars

AQBa Naked Quasars (In other words, there are no "host" galaxies.)

AQBb Young, Nearby Quasars (The consensus is that quasars are all distant.) (e.g.; quasar in Cygnus A) [AQF3]

AQBc Quasars More Common in Clusters of Galaxies

AQBd Quasar Epochs (There seem to have been bursts of quasar formation. Why?)

AQBe Puzzling Quasar Superclusters

AQBf Very Distant Quasars (Presumably these are very early quasars.) [QSO 1202-07, at a redshift of 4.38]

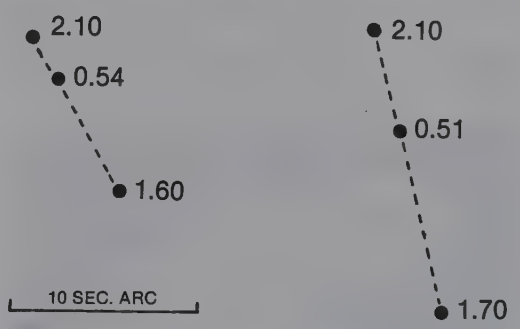


Diagram of two linear quasar triplets with varying redshifts. (New Scientist, 91:19, 1981.) [AQB5]

AQBg Quasars Apparently Disrupting Galaxies

AQBh Milky-Way Quasars (e.g.; GRS1915+105)

AQF QUASAR ANOMALIES DISCERNED VIA THEIR RADIATION

AQF1 Initial Increase of Bright Quasars with Redshift

AQF2 Quantization of Quasar Redshifts (One implication is that earth is at the center of concentric shells of quasars. The philosophical fallout would be profound; e.g., the earth is somehow

special!)

AQF3 Possible Redshift Cutoff for Quasars (Red shifts over 4.0 have been reported.) [AQBf]

AQF4 Flat Distribution of Faint Quasars (However, bright quasars increase in number with increasing red shift. Could there be two populations of quasars?)

AQF5 The Quasar Energy Paradox (i.e.; their brightness, distance, and size require incredible energy densities)

AQF6 Absence of Blue-Shifted Quasars

AQF7 Anomalous Redshifts of Quasar Absorption Lines

AQF8 Quasar Variability: Origin and Implications (The energy outputs may change suddenly or periodically.)

AQF9 Unresolved Nature of Blazers (BL Lacertae)

AQFa Engimatic Quasars with Abnormal Spectra (Are they related to black holes?) [AOFj]

AQFb Origin of Infrared Quasars

AQFc More Distant Quasars Contain More Iron

AQFd Origin of Gamma-Ray Quasars

AQFe Quasars with Noncosmological Redshifts

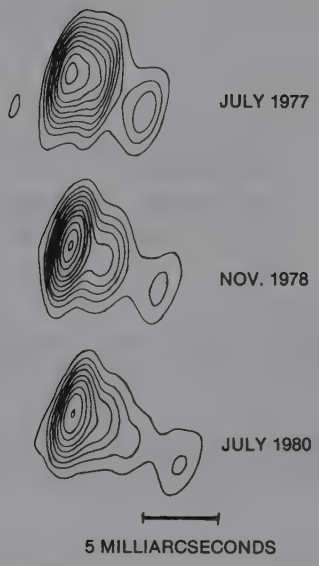
AQFf Quasars Apparently Hidden by Dust

AQO QUASAR MORPHOLOGY AND COMPONENT DYNAMICS

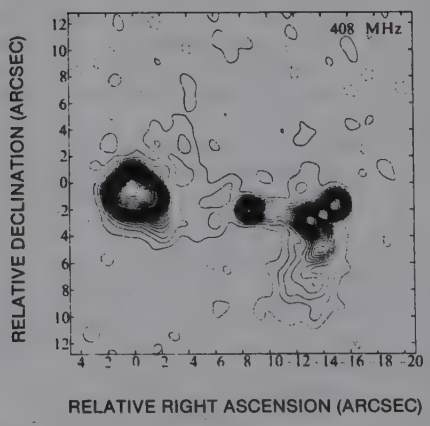
AQO1 Quasar Fuzz: What Is This Nebulosity?

AQO2 Anomalies of Quasar Radio-Jet Structures (e.g.; bipolarity, avoidance structures, hot spots)

AQO3 Superluminal Velocities in Quasars



Radio maps of quasar 3C273 at three different dates, showing the development of a one-sided jet. (Science, 225: 677, 1989.) [AQO2]



Radio map of quasar 3C179, showing its various components, some of which seem to move at speeds greater than that of light. (Nature, 268:405, 1977. [AQO3]

AR SATURN[6]

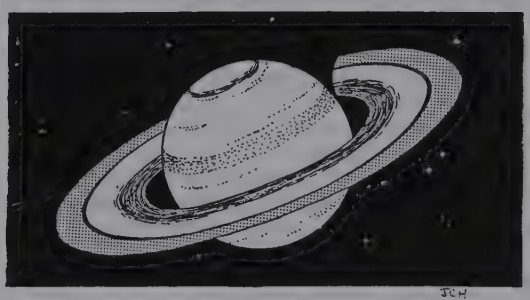
ARF SATURN'S INTRINSIC RADIATION
ARL SATELLITE AND RING ANOMALIES
ARO SATURN ANOMALIES SEEN THROUGH THE TELESCOPE

In a good telescope, Saturn is a spectacular sight. The rings, of course make all the difference; and there is where most of this planet's anomalies are discerned. Saturn has a long telescopic history of bright spots and curious shadows appearing on its rings. The Voyager spacecraft close-up photographs revealed that the rings are actually composed of thousands of tiny ringlets, some of which are eccentric, others twisted, and many spiral. The rings seem to be made up mostly of water ice. Some of the ring phenomena suggest that the rings may be young relative to the age of the solar system.

Saturn is also one of the planets that radiates more energy than it receives from the sun, indicating an internal power source of some kind.

ARF SATURN'S INTRINSIC RADIATION

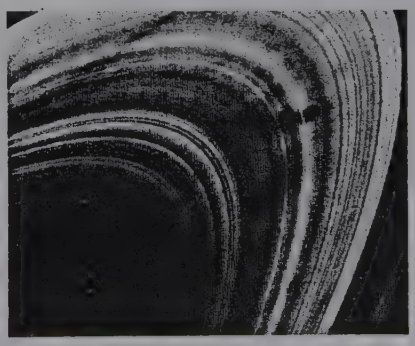
ARF1 Origin of Saturn's Electrostatic Discharges (SEDs)
ARF2 Measurements of Saturn's Intrinsic Energy (What is the source of this energy?)
ARF3 Sudden, Temporary Cessation of Radio Emissions from Saturn
ARFa Infrared Evidence for Atmospheric Water



April 25, 1889. Saturn's shadow on its rings curves the wrong way! (Sidereal Messenger, 9:255, 1890.) [ARL4]

ARL SATELLITE AND RING ANOMALIES

ARL1 Pre-Spacecraft Observations of Extra Rings (These have since been confirmed.)
ARL2 Knots in Saturn's Rings When Viewed Edgewise
ARL3 Bright Spots on Saturn's Rings (Some of the spots are small satellites, but not all.)
ARL4 Anomalous Shadows of the Planet on its Rings
ARL5 Dark Spokes in the Rings of Saturn
ARL6 Kinked and Inhomogeneous Rings
ARL7 Dark-Sided Iapetus (Nature of the dark material enigmatic.)
ARL8 Titan's Variable Brightness



Voyager photograph of dark spokes in the rings of Saturn. (New Scientist, 88:276, 1980.) [ARL5]

ARL9 Changes in Saturn's Rings Observed within Historical Times
ARL10 Explaining All of the "Gaps" between the Rings
ARL11 Ring Asymmetries and Eccentricities
ARL12 Hyperion's Chaotic Rotation
ARL13 Irregular Density Trend of Saturn's Moons
ARL14 Fine Structure of Saturn's Rings (e.g.; spirals, waves, stacked layers, etc.)
ARL15 Varying Crater Densities on Saturn's Moons
ARL16 Youthful Features of Saturn's Rings (e.g.; dynamic nature, seemingly retarded dispersal)
ARLa Evidence That the Rings May Be Composed of Ice Balls
ARLb Titan's Hydrocarbon Ocean and Its Mysterious Dark Shapes
ARLc Bright Infrared Spots on Titan
ARLd Titan's Exotic Atmosphere
ARLe Saturn's Supposed "Lost" Ring

ARO SATURN ANOMALIES SEEN THROUGH THE TELESCOPE

AROa Appearances of Great White Spots
AROb Saturn's Polar Hexagon (An atmospheric phenomenon explained as a stationary Rossby wave.)

AS THE SUN[7]

ASB THE SUN'S MOTION WITHIN THE GALAXY
ASF SOLAR RADIATION ANOMALIES
ASO ANOMALOUS VISUAL OBSERVATIONS OF THE SUN
ASX SOLAR ECLIPSE AND OCCULTATION PHENOMENA
ASZ SOLAR AND INTERPLANETARY MAGNETIC FIELD ANOMALIES

Some of the most interesting anomalies in astronomy are associated with our nearest star, the sun.

- The well-known sunspot cycle can be correlated not only with several terrestrial phenomena but also with the positions of its family of planets.
- The sun'a oblateness seems capable of explaining the advance of Mercury's perihelion, thereby removing one of the "proofs" General Relativity.
- Solar eclipses seem to have curious effects upon terrestrial pendulums.

ASB THE SUN'S MOTION WITHIN THE GALAXY

ASBa Sun's Unusual Orbit about the Galactic Center (The orbit is much less elliptical than other stars of its type.)
ASBb The Sun's Variable Rotation Rate (i.e.; parts of the sun rotate at different rates.)
ASBc Osclllations of the Sun about the Plane of the Galaxy (This motion may cause periodical encounters with space debris and account for the claimed 32-million-year cycle of terrestrial cratering.)

ASF SOLAR RADIATION ANOMALIES

ASF1 Large Changes in Solar-Flare Activity
ASF2 Periodicity of Solar Cosmic Rays (i.e.; a 29.5-day cycle)
ASF3 The "Missing" Solar Neutrinos (Now believed due to neutrino oscillations during their trip from the sun.)
ASF4 Large Variations in Isotopes Implanted by the Solar Wind
ASF5 Origin of the 155-Day Periodicity in Solar Flares
ASF6 Implication of Solar-Wind-Implanted Noble Gases (Hydrogen fusion may not be main solar energy source.)
ASFa Recent Brightenings of the Sun
ASFb Superflares (10,000 times as powerful as the 1989 outburst.)
ASFc Evidence of a Slow, but Steady, Fading of the Sun
ASFd Terrestrial Effects of High Solar Activity (The 1989 outburst knocked out a Canadian power grid.)
ASFe Solar Neutrino/Solar Wind Correlations [ASFj]
ASFf Solar Lithium Deficiency [AOFc]
ASFg The "Weak-Sun" Paradox (Early planetary temperatures remained above freezing despite lower solar luminosity.)
ASFh Origin of Solar-Wind Variations and Periodicities
ASFi Solar-Neutrino Periodicity (The flux seems to peak every 21.3 days.)
ASFj Solar-Neutrinos Anticorrelated with Sunspots [ASFe]

ASO ANOMALOUS VISUAL OBSERVATIONS OF THE SUN

ASO1 Transient Dark Regions on the Sun
ASO2 Remarkable Coronas (i.e.; odd shapes, such as crosses)
ASO3 Curious Bulges on the Solar

An unexplained ring-like structure in the solar corona appeared during 1896. (C.A. Young; The Corona, 1896.) [ASO2]

Limb

ASO4 Evidence of Past Prolonged Minima in Solar Activity (As seen in terrestrial geophysical phenomena. such as climate.) [EWHc]

ASO5 Short-Term Periodicities in Sunspot Numbers (e.g.; 25 months)

ASO6 Solar Oblateness and Quadrupole Moment (Solar oblateness may account for the anomalous precession of Mercury's orbit, eliminating the need for relativity.) [CRGh]

ASO7 Changes in the Rate of Solar Rotation

ASO8 Observations of Changes in the Solar Diameter [ASO10]

ASO9 Correlation of Sunspot Numbers and Planetary Configurations [GER11, GEZ4, BHB12, BHB28]

ASO10 Radial Solar Oscillations [ASO8]

ASOa Sunspot Periodicity Correlated with Solar Rotation

ASOb Variability of the Sunspot Cycle (The nominal 11-year cycle varies between 8 and 17 years.)

ASOc Bimodality of the Solar Cycle (But it is actually a 22-year cycle.)

ASOd Origin of the Solar Cycle

ASOe Shadow-Like Streaks on Sun

ASOf Origin of the Ultraviolet Flashes

ASOg Unexplained Origin of the Corona

ASX SOLAR ECLIPSE AND OCCULTATION PHENOMENA

ASX1 Curiosities of Bailey's Beads (Some have no correlation with lunar topography.)

ASX2 Visibility of the Moon's Limb during Solar Eclipses

ASX3 Fingers of Light Projected on the Moon

ASX4 Thin Pencils of Light Extending Far beyond the Corona

ASX5 Exaggerated Notches in the Moon's Limb during Solar Eclipses

ASX6 Pendulum Perturbations during Solar Eclipses [CFXa]

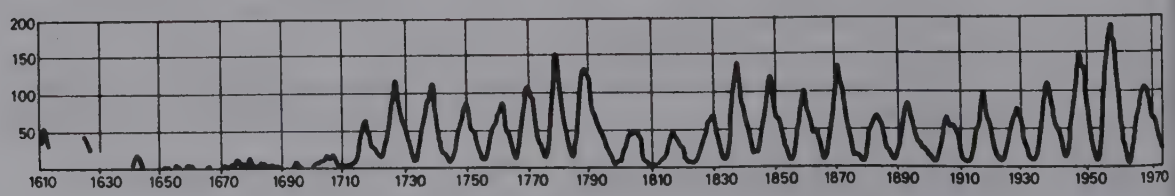
ASX7 Spacecraft Signal Perturbations during Solar Occultations

ASX8 Increases of Galactic Radio Noise during Total Solar Eclipses

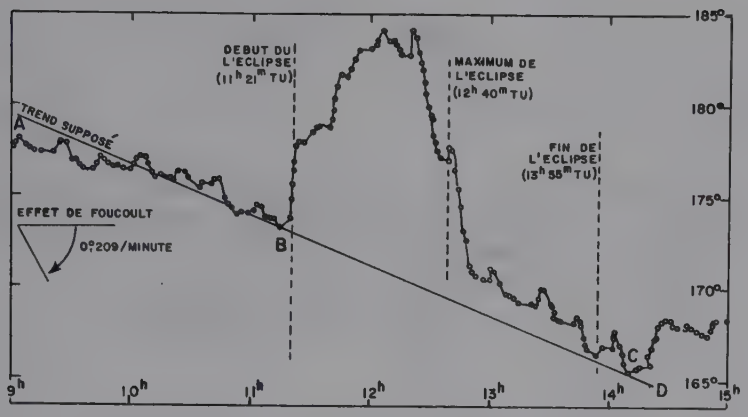
ASX9 Large Discrepancies between Calculated and Observed Eclipse Parameters

ASXa Purported Effect of Solar Eclipses on Atomic Clocks

ASXb Eclipse Disappearance of White-Light Corona



The sunspot record between 1610 and 1975 illustrates that the sunspots nearly disappeared during the Maunder Minimum, 1645-1715. (Scientific American Supplement, 38:15569, 1894.) [ASO4]



June 30, 1954. The effect of a solar eclipse upon a paraconical pendulum. (Aerospace Engineering, 18:46, September 1959.) [ASX6]

ASZ SOLAR AND INTERPLANETARY MAGNETIC-FIELD ANOMALIES

ASZ1 Sudden, Unexplained Enhancements of the Interplanetary Magnetic Field

ASZ2 Compatibility of Interplanetary Magnetic Field Measurements with an Electrically Charged Sun [ATGt]

ASZa Apparent Lack of a South Solar Magnetic Pole

AT THE COSMOS[8]

ATB	UNIVERSE DYNAMICS AND MASS DISTRIBUTION
ATF	COSMIC ANOMALIES DETECTED THROUGH RADIATION
ATG	GENERAL COSMOLOGY
ATO	OBJECTS IN INTERGALACTIC SPACE
ATZ	INTERGALACTIC MAGNETIC FIELDS

In this section we have deliberately refrained from theory and speculation, although some of each admittedly seeps in. The real focus is intended to be the observed facts of the cosmos.

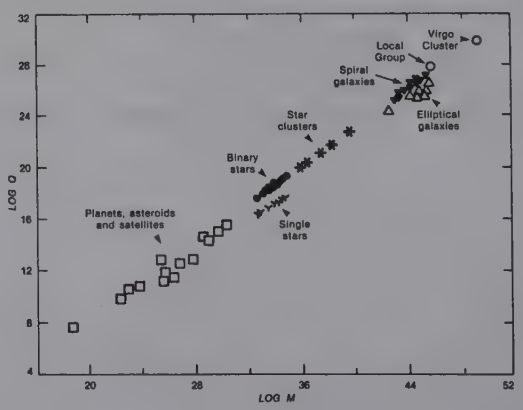
Nothing is more obvious than the existence of the universe, and we begin there. The universe is made "real" by the radiation its components emit; that is, everything from hard gamma rays to the infrared, plus, of course, the particulate cosmic rays that are perpetually showering us. In analyzing this incoming radiation, we hope to find answers to the larger questions of astronomy, such as:

(1) The simple (?) "existence" question, which must, of course, include a "creation" scenario of some sort.
(2) What are the size, shape, and age of the universe?
(3) Do large-scale motions exist within the universe, such as universal rotation?
(4) Why is there no appreciable antimatter around?
(5) Is the universe truly expanding as suggested by redshift measurements?
(6) Does life exist elsewhere in the cosmos?

Three other sections are also of interest when such questions are profferred: AO Stars; AQ Quasars; and AW Galaxies.

ATB UNIVERSE DYNAMICS AND MASS DISTRIBUTION

ATB1	The Origin and Existence of the Universe (In essence, why is there anything?)
ATB2	The Low Mean Density of Detectable Matter in the Universe
ATB3	An Angular Momentum-Mass Relationship for a Wide Range of Astronomical Objects
ATB4	Evidence for Universal Rotation
ATBa	The "Fingers of God" (So-called because filaments of galaxies are lined up pointing at earth, implying a special position in the cosmos.)
ATBb	Accelerating Expansion of the Universe and Postulated Dark Energy [CFRa]

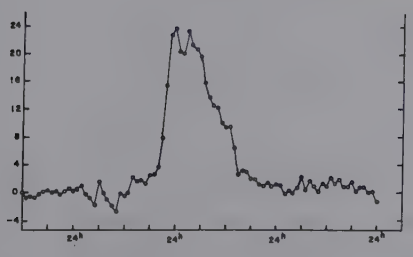


A possible universal relationship between the angular momenta and masses of astronomical objects. (Sky & Telescope, 64: 228, 1982.) [ATB3]

ATBc A Twisted Universe? (Like a Mobius strip?)
ATBd Observations Supporting Geocentricity and Critiques Thereof
ATBe Central-Sun Hypothesis (A curious 1846 claim of a central star about which our sun and all other stars rotated.)
ATBf The Several Inflation Theories (i.e.; early, abrupt expansions of the universe)

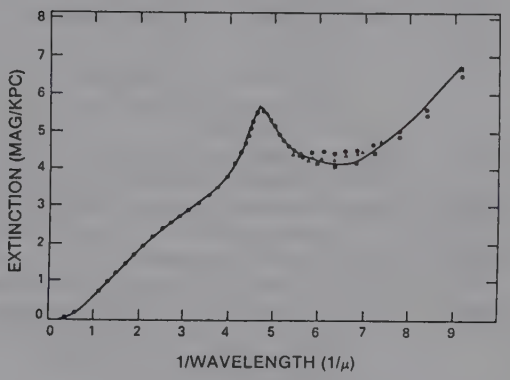
ATF COSMIC ANOMALIES DETECTED THROUGH RADIATION

ATF1 Isotropy of Cosmic Background Radiation
ATF2 Deviations of the Cosmic Background Radiation from the Blackbody Curve
ATF3 The Origin of Low-Energy Cosmic Rays (i.e.; below 10^{19} electron volts) (These are thought to originate in the galaxy.) [ATF5]
ATF4 The Isotropic Cosmic X-Ray Background
ATF5 The Origin of Ultra-High-Energy Cosmic Rays (i.e.; over 10^{19} electron volts) [ATF3]
ATF6 The High Flux of Low-Energy Antiprotons
ATF7 Origin of Antineutrino Pulses
ATF8 Apparent Absence of Appreciable Antimatter in the Observable Universe [ATGh]
ATF9 Exceptional Increases in Cosmic-Ray Intensity



August 13, 1942. An exceptional, difficult-to-explain increase in cosmic radiation. The ordinate is in percentage of deviation from normal. (Nature, 151:308, 1943.) [ATF9]

ATF10 Asymmetry of Infrared Background Radiation
ATF11 Nondoppler Redshifts [AWB7]
ATF12 Spectroscopic Evidence of Life in Space



The starlight absorption curve (dotted). A good fit (solid curve) is achieved by assuming a mixture of bacilli (65%), mycoplasmas (25%), and graphite spheres (10%). (F. Hoyle and C. Wickramasinghe; Space Travellers: The Bringers of Life, 1981.) [ATF12]

ATFa Existence of Primordial Helium
ATFb Puzzle of Diffuse Interstellar Bands
ATFc Strange Matter in Cosmic Rays [ATGd, CPZh]
ATFd Excess Muons in Cosmic Rays
ATFe Gaps in the Cosmic-Ray Spectrum
ATFf Anomalous Cosmic Rays (e.g.; including exotic particles)
ATFg Excess Fluroine in Universe
ATFh Gamma-Ray Sources and Gamma-Ray Background
ATFi Neutrino Flurries
ATFj Anomalously Heavy Cosmic-Ray Particles

ATG GENERAL COSMOLOGY

ATGa Reality of the Cosmological Constant and the Curvature of Space
ATGb Modified Newtonian Dynamics (MOND)

ATGc Anomalous Amount of Baryonic Matter in the Universe
ATGd Exotic Matter, Strange Matter, Shadow Matter, Mirror Matter [ATGr, CPZh, CZZq]
ATGe Controversies over the Hubble Constant, Age of Universe, the Cosmological Distance Scale, the Reality of the Expanding Universe (See also ATBb: the apparent accelerating expansion of the universe.)
ATGf Noncosmological Redshifts Due to Gravity, Tired Light
ATGg Evidence Supporting Dirac Cosmologies
ATGh Dearth of Antimatter in the Universe and Its Significance
ATGi Other Dimensions and Universes (e.g.; the many-universe interpretation of quantum mechanics) [CQWa]
ATGj Evidence for an Anthropic Universe (i.e.; a universe precisely tuned to support human existence)
ATGk Evidence for the Darwinian Evolution of Universes (i.e.; survival of the "fittest" universe)
ATGl Stellar Aberration Anomalies
ATGm Evidence for a Cyclical Universe (i.e.; one which expands and contracts)
ATGn Olber's Paradox and Its Accepted Explanation
ATGo Steady-State and Quasi-Steady-State Universes [ATB1]
ATGp The Dark-Matter/Missing-Mass Conundrum
ATGq Evidence for Extraterrestrial Life [XSM, XSS, XU]
ATGr Evidence for Mirror Matter [CPZb, CZZq]
ATGs Evidence in Support of the Alfven Plasma Universe
ATGt Possible Role of Electricity in Cosmology [ASZ2]

ATO OBJECTS IN INTERGALACTIC SPACE

ATO1 Origin and Motion of Intergalactic Clouds [AOOa]

ATZ INTERGALACTIC MAGNETIC FIELDS

ATZa Origin of Intergalactic Magnetic Fields

AU URANUS[6]

AUB URANIAN ORBITAL AND ORIENTATION PHENOMENA
AUF URANIAN INTRINSIC RADIATION
AUL RING AND SATELLITE PHENOMENA AT URANUS
AUO TELESCOPIC ANOMALIES
AUZ THE ANOMALOUS URANIAN MAGNETIC FIELD

Like Neptune, Uranus is smaller and more dense than the two giants of the solar system, Jupiter and Saturn. Uranus, however, like Saturn, does possess a ring system---a rather strange one at that. Uranus also boasts a magnetic field, but its axis is tilted away from its spin axis. The planet's spin axis is much awry, too, for it lies almost in the plane of its orbit around the sun. Finally, the brightness of Uranus varies periodically. All in all, it is a puzzling planet.

AUB URANIAN ORBITAL AND ORIENTATION PHENOMENA

AUB1 Anomalous Inclination of Uranus's Axis [AUZa]
AUBa Large Residual of Orbit and Planet X [ANB1, AXO]

AUF URANIAN INTRINSIC RADIATION

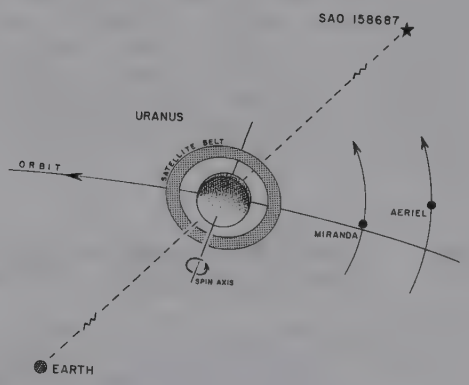
AUF1 Secular Changes in Radio Emissions
AUFa Spectra Suggest an Anomalous Helium Abundance

AUL RING AND SATELLITE PHENOMENA AT URANUS

AUL1 The Mysterious Rings of Uranus (They are extremely narrow, have low albedos, and inclined to the planet's equatorial plane.)
AULa Miranda's Strange Patchy Surface
AULb Unknown Energy Source for Satellite Activity
AULc Umbriel's Unexplained Darkness
AULd Persistence of Satellite Eccentricities

AUO TELESCOPIC ANOMALIES

AUO1 Periodic Brightening of Uranus



Geometry for the March 10, 1977, occultation of the star SAO 158687, during which the ring structure of Uranus was discerned. (Nature, 266:587, 1977.) [AUL1]

AUOa Apparent Existence of Superheated Water-Ocean 5,000 Miles Deep!

AUZ THE ANOMALOUS URANIAN MAGNETIC FIELD

AUZa Highly Tilted Magnetic Field [AHZ1, AJZa, ANZa, AUB1, EZF1]

AV VENUS[6]

AVB VENUSIAN ORBITAL AND SPIN ANOMALIES
AVE GEOLOGICAL PHENOMENA OBSERVED ON VENUS
AVF INTRINSIC RADIATION SOURCES OF VENUS
AVL POSSIBLE TEMPORARY NATURAL SATELLITES
AVO ANOMALOUS TELESCOPIC OBSERVATIONS
AVR VENUSIAN RADAR ANOMALIES
AVW ATMOSPHERIC ENIGMAS
AVX TRANSIT ANOMALIES
AVZ THE NEGLIGIBLE VENUSIAN MAGNETIC FIELD

Despite its dense atmospheric shield, Venus presents many enigmas to the terrestrial observer with a telescope. Many of these mysteries involve optical and, probably, some subjective factors; for example, the eerie ashen light, the blunted cusps or horns, the fleeting radial spoke system, and the famous phase anomaly. Then there was Neith, the lost satellite of Venus, confirmed by many astronomers during the nineteenth century. Unexpectedly, Venus is in resonance with the earth. When the two planets are closest (at inferior conjunction) Venus always points the same face toward the earth. Unlike its closest neighbors, Mercury and earth, Venus has no detectable magnetic field. Venus is so different that some suspect it had a radically different evolutionary history.

AVB VENUSIAN ORBITAL AND SPIN ANOMALIES

AVB1 The Length of the Venusian Day: 243 Days (The rotation of Venus is retrograde and apparently in resonance with earth's orbit.)
AVB2 The Residual Advance of the Perihelion of Venus [AHB1, CRGh]
AVB3 Claimed Changes in Venus's Orbit in Historical Times

AVE GEOLOGICAL PHENOMENA OBSERVED ON VENUS

AVE1 Origin of Sharp-Edged Angular Rocks
AVE2 Origin of Layered Rocks That Appear Sedimentary
AVE3 Lack of Water on Venus [AVEf, AVW2]
AVE4 Origin of Large Ring Structures
AVEa Lack of Small Craters [AVEc]
AVEb Long, River-Like Features
AVEc Youthful (Pristine) Nature of Venusian Surface [AVEa]
AVEd Origin of Abundant Dome-Shaped Features
AVEe Curious, Unexplained, Cross-Hatched Surface Structures
AVEf Proposed Early Loss of Water and Current Presence of Carbonates [AVE3]
AVEg Unexplained Patterns of Hexagonal Cracks

AVF INTRINSIC RADIATION SOURCES OF VENUS

AVF1 Sharp Shadows of Rocks on Venusian Surface
AVF2 Bright Infrared Structures
AVF3 Intrinsic Heat Radiation from Venus
AVFa Low-Altitude Impulsive Radio Signals

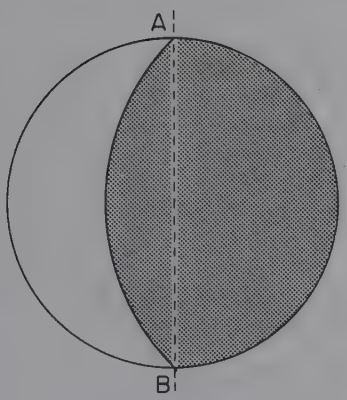
AVL POSSIBLE TEMPORARY NATURAL SATELLITES

AVL1 Bright Objects Resembling Venusian Satellites (Historically, these objects were ascribed to Neith, the

presumed satellite of Venus.)

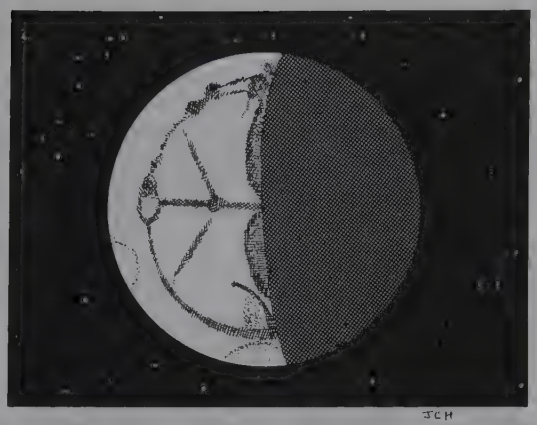
AVO ANOMALOUS TELESCOPIC OBSERVATIONS

AVO1 Venusian Cusp Phenomena
AVO2 Ring of Light around the Dark Side of Venus [ALO9]
AVO3 The Ashen-Light Phenomenon (A soft glowing of the dark side of the planet.) [AVF]
AVO4 The Phase Anomaly of Venus (The retardation of phase in western elongations, and acceleration in eastern.)



At the theoretical phase dichotomy (AB), the sun should illuminate exactly half the disk of Venus, but actual observations lead or lag theory considerably. (Strolling Astronomer, 15:49, 1961. [AVO4]

AVO5 Venus Seen Darker than the Sky
AVO6 The Venusian Spoke System (A strange wheel-like arrangement of lineaments.)
AVO7 Transient Bright Spots or Patches
AVO8 The Maedler Phenomenon (Fans of light emanating from the two cusps.)
AVO9 Flickering Light on Dark Limb
AVO10 Terminator Irregularities (e.g.; serrations, reversed S-shape)
AVOa Unusual Dark Spots
AVOb Origin of Apparent Auroral Phenomena



February 17, 1897. Griffith's sketch of the Venusian spoke system. (British Astronomical Association, Journal, 8:94, 1897. [AVO6]

AVR VENUSIAN RADAR ANOMALIES

AVRa Radar Returns Suggesting a Metallic "Frost" Covering Some of the Planet
AVRb Existence of Airblast Scars around Craters

AVW ATMOSPHERIC ENIGMAS

AVW1 Superrotation of the Venusian Atmosphere (i.e.; it rotates faster than the planet)
AVW2 Anomalous Distribution and Scarcity of Water Vapor (What water exists seems to occur as vapor concentrated at high altitudes.)
AVW3 Periodic Variation of CO_2 Absorption Lines
AVW4 Noble-Gas Anomalies (e.g.; 75 times as much argon-36 as earth's atmosphere)
AVWa Unknown Origin of the Planet's Long Ion Tail

AVX TRANSIT ANOMALIES

AVX1 Ring of Light around Venus during Contact Phase [AHX2]

AVXa Black-Drop Phenomenon during Transit (The retarded detachment of the transiting planet from the sun's limb. Considered an optical effect and nonanomalous.)

AVXb Sudden Disappearance and Reappearance during Eclipses by the Moon [ALX2]

AVZ THE NEGLIGIBLE VENUSIAN MAGNETIC FIELD

AVZ1 The Negligible Magnetic Field of Venus (Unexpected in view of the strong fields of adjacent Mercury and earth.)

AW GALAXIES[8]

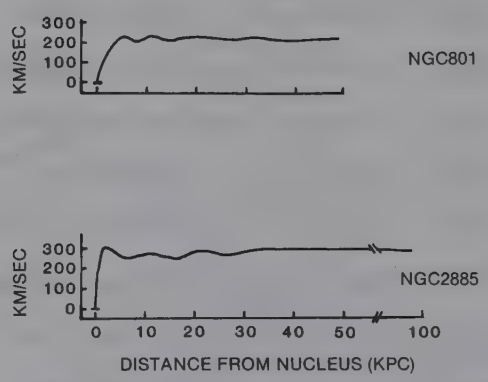
AWB DISTRIBUTION AND DYNAMICS OF GALAXIES
AWF ANOMALIES DISCERNED VIA RADIATION FROM GALAXIES
AWO MORPHOLOGY AND STRUCTURE OF GALAXIES
AWZ GALACTIC MAGNETIC FIELDS

Galaxies seem to be isolated islands of stars in space; independent aggregations of millions, even trillions, of stars. Many take on the familiar spiral shape; others are elliptical; some are irregular in morphology. Actually, galaxies are not as independent are astronomers once thought. Some reside in clusters of hundreds. Then, there are the superclusters containing smaller clusters. Some galaxies seem to be connected to others via bridges of matter.

As with stars, the vexing redshift question arises, for the redshifts of some galaxies seem to be quantized. The source of galactic rotation is also a problem. Why do the spirals spin? The constrained motion of the stars within galaxies highlight the "missing mass" conundrum. The giant elliptical galaxies pose several additional enigmas: their jets of matter; the concentric shells of stars surrounding them; their double radio lobes; etc.

AWB DISTRIBUTION AND DYNAMICS OF GALAXIES

AWB1 The Origin and Existence of Galactic Clusters
AWB2 The Origin and Existence of Superclusters of Galaxies
AWB3 The Origin and Existence of Large Voids in the Universe [AWB4]
AWB4 The Apparent Swiss-Cheese Structure of the Universe [AWB3]
AWB5 The Anomalous Rotation of Matter in Galaxies (The high circular velocity of matter in outer reaches of galaxies, suggesting missing mass.)
AWB6 Large-Scale Anisotropy in Galaxy Distribution (the purported "Great Wall") [AWB3, AWB4]
AWB7 Galaxies That Seem Physically Associated But with Discordant Redshifts [ATF11]
AWB8 Large-Scale Streaming of Superclusters (The existence of a so-called "Great Attractor.")
AWB9 The Origin of Galactic Rotation (Actually, this anomaly extends to all spinning bodies.)



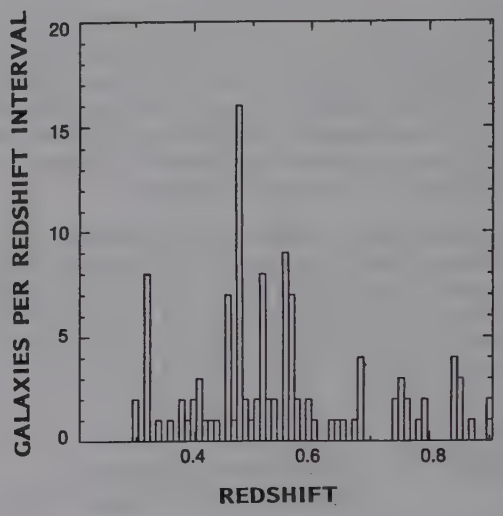
Velocity profiles of matter in two galaxies. Newton's Law states that the galaxy's stars should slow down with distance from the center of the galaxy. The hypothetical "missing mass" is thought to account for this anomaly. (Science, 220:1339, 1983.) [AWB5]

AWB10 Lines of Galaxies Associated With Elliptical Radio-Bright Galaxies
AWB11 Spirals and Ellipticals Have Markedly Different Population Densities

AWB12 Unknown Significance of the Smooth Background Population of Lone Galaxies
AWB13 Apparent Rapid Dispersal of Galactic Clusters
AWB14 Structures Larger Than Superclusters [AWB2]
AWB15 Anomalous Gas Motion in Elliptical Galaxies
AWB16 Preferred Orientation of Galaxies in Clusters
AWB17 The Origin and Existence of Galaxies
AWBa The Apparent Fractal Structure of the Universe
AWBb Galaxies with Double Nuclei
AWBc Galaxies Thought to Be Hidden by Dust
AWBd Three-Dimensional Regularities in Galaxy Distribution (i.e.; the so-called "Crystalline Universe.")
AWBe Very Distant, Very Old Quasars
AWBf Apparently Missing Elliptical Galaxies (Supposedly the oldest galaxies, they seem to be too rare at high red shifts.)
AWBg Galaxies with Anomalous Mixtures of Stars
AWBh Superluminal Motion in Galaxies [AQO3]
AWBi Starburst Rings around Galaxies [AWO6]
AWBj Merging and "Cannibalistic" Galaxies
AWBk Apparent Disappearance of Some Dwarf Galaxies
AWBl Apparent Disappearance of Some Blue Galaxies
AWBm Overabundance of Very Faint Galaxies
AWBn A Claimed Epoch of Missing Spiral Galaxies
AWBo Earlier Galaxies Spin Faster
AWBp Late-Forming Galaxies
AWBq Very Early Galaxy Clusters
AWBr Is Our Galaxy Located in a Gigantic Void?

AWF ANOMALIES DISCERNED VIA RADIATION FROM GALAXIES

AWF1 The Slight Blueness of Distant Galaxies
AWF2 The Seyfert-Galaxy Energy Problem
AWF3 Origin of Superluminous Infrared Galaxies
AWF4 Luminosity Changes in Ordinary Galaxies
AWF5 Variable X-Ray-Bright Galaxies
AWF6 Ultraviolet Radiation from Elliptical Galaxies
AWF7 Anomalous Radio Pulses from Galaxies
AWF8 Quantization of Galaxy-Redshift Differences [ATGu]



Distant galaxies seem to cluster at certain redshift values. In other words, their distribution seems to be quantized. (New Scientist, p. 19, October 5, 1996.) [AWF8]

AWF9 Cluster Spiral Galaxies Have Higher Redshifts Than Those in Ellipticals
AWF10 Apparent Velocity (Redshift) Dispersion in Lines of Galaxies Apparently Emanating from Radio Sources
AWF11 Blueshifted Extragalactic Objects
AWFa Gamma-Ray Halos around Galaxies [AWO11]
AWFb Anomalous Polarization of Galactic Radiation (It suggests universe has a preferred axis.) [ATB4]
AWFc Antimatter Jet in Milky Way [AWFf]
AWFd On-and-Off Radio Galaxies
AWFe Nature of Massive Compact Halo Objects (MACHOs) in Galaxies
AWFf Antimatter Source in Galaxy [AWFc]

AWFg Existence of Large Numbers of Very Faint Galaxies (Most galaxies may be faint and the cosmos more crowded than usually believed. They are sometimes called the 'invisible galaxies.') [AWFk]
AWFh Thorium Age-Measurements of Galaxies (These lead to an anomalously young age for the universe.)
AWFi Ultraviolet Flares in Milky Way
AWFj Anomalous Abundance of Heavy Elements in Magellanic Clouds
AWFk Low-Surface-Brightness Galaxies (e.g.; Malin I) [AWFg]
AWFl Origin and Existence of Radio Galaxies
AWFm Megamasers, Maser Spots in Galaxies
AWFn Unexplained Gamma-Ray Outbursts of Markarian-501

AWO MORPHOLOGY AND STRUCTURE OF GALAXIES

AWO1 Superluminal Motion in Galactic Jets [AMFc, AQO3, AWBh]
AWO2 Radio-Luminous Rings Associated with Galaxies
AWO3 Radio-Luminous Threads inside Galaxies [AWOs]
AWO4 Bridges and Tails Connecting Different Galaxies [AWOe]
AWO5 Concentric Partial Shells of Stars around Some Elliptical Galaxies
AWO6 Ring Galaxies (i.e.; no nucleus of stars)
AWO7 Galaxies with Polar Rings of Material
AWO8 Disk Galaxies with Warped Edges
AWO9 Asymmetrical Galaxies
AWO10 Clumpy Galaxies
AWO11 Galactic Halos [AWFa]
AWO12 Oblateness of Some Elliptical Galaxies
AWO13 Anomalies of Spiral Galaxies (e.g.; disk-shapes, spiral arms, bars)
AWO14 Origin and Persistence of Double Radio Sources
AWO15 Anomalous Gravitational Distortion of Galactic Images (The missing mass missing?)
AWOa Magellanic-Cloud Anomalies (e.g.; "populous" star clusters less dense than globular clusters)
AWOb "Ghost" Galaxies (Characterized by low surface brightness. [AWFg, AWFk]
AWOc Possible Presence of Extragalactic Interlopers
AWOd Origin of Turbulence in Galaxies
AWOe Luminous Arcs between Galaxies [AWO4]
AWOf Multispin Galaxies (i.e.; stars orbiting in opposite directions) [AOBd, AOB10]
AWOg Giant Galaxies (e.g.; Malin I)
AWOh Starburst Galaxies
AWOi Apparent Galactic Ejection of Quasars
AWOj Gas in Elliptical Galaxies (Conventional wisdom requires no gas in ellipticals.)
AWOk Wrong-Way Spiral-Galaxy Arm
AWOl Anomalously Early Spirals
AWOm Whole-Galaxy Oscillations
AWOn String-Shaped Galaxies
AWOo Dark, Massive Objects in Galactic Nuclei
AWOp Quasar-Like Activity on Fringes of Radio Galaxies
AWOq Dearth of Dwarf Galaxies
AWOr Filaments in Galaxy Center [AWO3]
AWOs Origin of the Bulge in Many Spiral Galaxies

AWZ GALACTIC MAGNETIC FIELDS

AWZ1 Magnetic-Field Anomalies in Our Galaxy
1.1 The Time-of-Generation Paradox (Time-of-generation theoretically longer than the age of the universe!)
1.2 Origin and Unknown Nature of Our Galaxy's Large-Scale Field
AWZa Remote Galaxies with Powerful Magnetic Fields
AWZb Magnetic Fields of Galaxy Clusters
AWZc Origin of Galactic Magnetic Fields
AWZd Galaxies with Magnetic Spiral Arms

AX PLANET X[7]

AXO OBSERVATIONS OF PLANET X

For years, astronomers have searched for a "Planet X," a large object beyond Pluto's orbit. This search is fuelled by the disorder seen in the orbits and spins of the Uranus, Neptune, and Pluto, and by the rare spottings of suspicious objects at the outer reaches of the solar system. Usually, however, the Planet-X candidates turn out to be asteroids or comets.

Today, visual searches for Planet X are supplemented by infrared and radio observations. And, indeed, a whole new roster of suspect infrared objects and radio anomalies has been drawn up.

AXO OBSERVATIONS OF PLANET X

AXO1 Visual Observations of Planet X (e.g.; the 1924 Ottawa Object)
AXO2 Claimed Infrared Observations of Planet X
AXO3 Radio Observations of Planet X

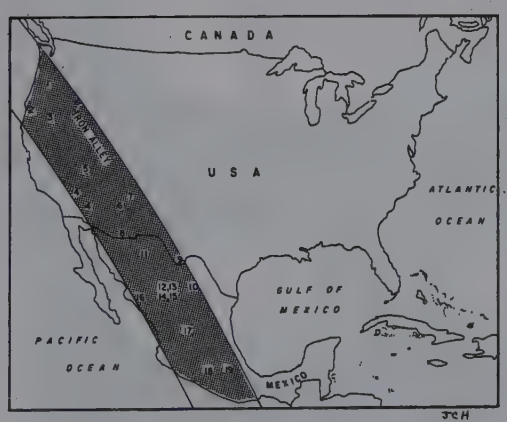
AY METEORS AND METEORITES[7]

AYB METEOR AND METEORITE FLUX ANOMALIES
AYE ANOMALIES IN METEORITE COMPOSITION AND STRUCTURE
AYO ENIGMAS POSED BY METEORS IN FLIGHT

Meteorites constitute our prime source of extraterrestrial matter. The flight of meteors may be anomalously slow and/or irregular in direction. Sometimes, as in 1913, eerie, majestic processions of large meteors parade across the sky. There are also temporal and geographical oddities, such as the concentration of meteorites on Australia's Nullarbor Plain and the Antarctic snows. Meteorite compositions vary widely, some containing considerable organic material and even suggestions of life forms.

AYB METEOR AND METEORITE FLUX ANOMALIES

AYB1 Significance of Stationary Meteor Radiants
AYB2 Meteor Rates Correlated with with Solar Activity
AYB3 Meteor Rates Correlated with with Lunar Phase
AYB4 Meteorites: Geographical Anomalies (e.g.; Iron Alley) [AYEg, ESM1]
AYB5 Meteor and Meteorite Temporal Anomalies (e.g.; daily 3 A.M. peaks)
AYB6 The Unexpected Abundance of Very Large Meteors
AYB7 Small Clouds or Swarms of Meteors (These are on a scale smaller than meteor the classic meteor showers.)
AYB8 Micrometeoroid Loss-Gain Imbalance (i.e.; loss to Poynting-Robertson effect much greater than additions due to comet distintgration)
AYBa Meteors Exceeding Escape Velocity, Interstellar Meteors
AYBb Apparent Absence of Meteorites Stemming from the Tunguska Event of 1908
AYBc Meteorites Impacting Humans and Human Structures



"Iron Alley," according to T.R. LeMaire, where an unusual number of iron meteorites land. (T.R. LeMaire, Stones from the Stars, 1980.) [AYB4]

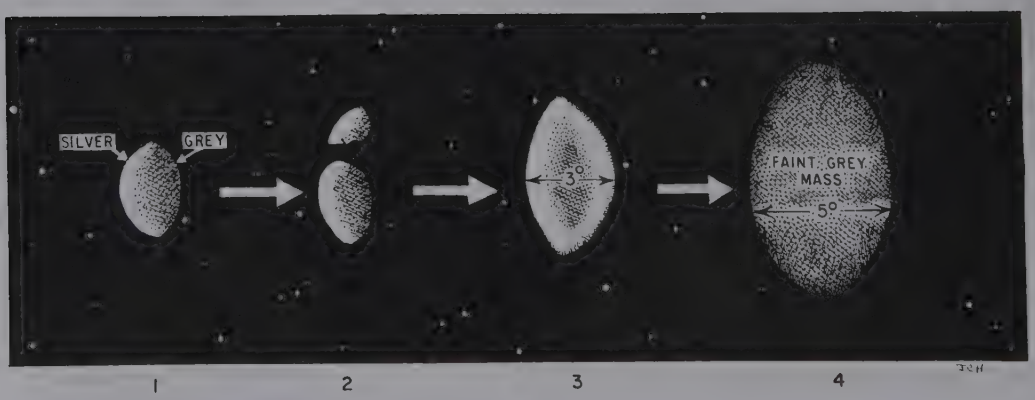
AYE ANOMALIES IN METEORITE COMPOSITION AND STRUCTURE

AYE1 Isotopic and Inorganic Chemical Chemical Anomalies
AYE2 Organic Compounds in Meteorites
AYE3 Unusual Meteorite-Exposure Ages (e.g.; clustering of exposure ages around specific times) [AYEf]

AYE4 Anomalous Formation Ages of Meteorites (e.g.; iron meteorites younger than the solar system)
AYE5 Claims of "Sedimentary" Meteorites
AYE6 Annihilation-Radiation Events Ascribed to Antimatter Meteorites
AYE7 Meteorite Magnetic Anomalies (e.g.; meteorites with multiple poles) [AYZ]
AYE8 The Unexplained Origin(s) of Chondrules
AYE9 The Origin and History of the Brownlee Particles [AZO16]
AYE10 Lack of Correspondence between Meteorite and Asteroid Compositions
AYEa SNC (Martian) Meteorites [AYE1]
AYEb Meteorites Containing Possible Life Forms, Organized Elements [AYEa, AYEe]
AYEc Lunar Meteorites [AYE1]
AYEd Buckyballs from Outer Space
AYEe Evidence for Panspermia [AYEb]
AYEf Clustering of Cosmic-Ray-Exposure Ages [AYE3]
AYEg Antarctic Meteorites Differ from Those Elsewhere
AYEh Dearth of Meteorites in Terrestrial Sediments [ESI8]

AYO ENIGMAS POSED BY METEORS IN FLIGHT

AYO1 The Spates of Peculiar Green Meteors and Fireballs [GLN2]
AYO2 Erratic Meteors (e.g.; meteors traveling zigzag or undulating paths)
AYO3 Atmospheric Debris Resembling Meteors in Flight (e.g.; airborne seeds)
AYO4 Large Meteorites with Negligible Craters
AYO5 Reports of Meteor In-Flight Collisions
AYO6 Meteors of Anomalously Long Duration (i.e.; in sight for more than 10 seconds)
AYO7 Fireball Processions (e.g.; the great February 9, 1913, procession)
AYO8 Nebulous Meteors (i.e.; fuzzy meteors without cores)
AYO9 Rebrightening of Meteor Trails
AYO10 Dark Meteor-Like Streaks in the Sky
AYO11 Long, Hollow Cylinders of Meteoric Dust
AYOa Meteors Visible at Anomalously High Altitudes
AYOb Meteors That Skip Off the Atmosphere
AYOc Unusually Intense Meteor Showers
AYOd Tunguska-Event Visual Phenomena [GLM2]



July 29, 1970. Evolution of a "nebulous" meteor over Dover, England. (Strolling Astronomer, 36:115, 1992.) [AOY8]

AZ THE ZODIACAL LIGHT[7]

AZO IDIOSYNCRACIES OF THE ZODIACAL LIGHT

The zodiacal light normally consists of two faint cones of light with their axes in the plane of the ecliptic. The evening cone follows the setting of the sun; the morning cone cone announces the rising sun. Modern astronomers attribute the zodiacal light to sunlight scattered from an interplanetary cloud of dust located between Mercury and the asteroid belt. However, some observations of the zodiacal light cast doubt upon the location of the reflecting material and its long-term stability.

AZO IDIOSYNCRACIES OF THE ZODIACAL LIGHT

AZO1 Varying Visibility of the Zodiacal Light with Geographic Location
AZO2 Zodiacal Light Observed on Northern Horizons in Northern Hemisphere
AZO3 Irregularities in the Shape of the Zodiacal Light
AZO4 Irregular and Sporadic Changes in Brightness
AZO5 Zodiacal-Light Color Changes
AZO6 Correlations of Brightness Changes with Solar Activity
AZO7 Seasonal Variations of the Zodiacal Light
AZO8 Unusual Extensions along the Ecliptic
AZO9 Moon's Shadow Dimming the Zodiacal Light
AZO10 Infrared Images of Unexpected Dust Clouds
AZO11 The False Zodiacal Light (i.e.; the so-called "false dawn")
AZO12 The Lunar Zodiacal Light
AZO13 Zodiacal Light Brightness Correlated with Lunar Phase
AZO14 Zodiacal Light Brightness Correlated with the Comet Encke
AZO15 "Waving" of the Axis of the Zodiacal Light
AZO16 Apparent Youth of Interplanetary Dust Particles [AYE4]
AZO17 Parallax of the Gegenschein
AZOa Dust in Solar System (e.g.; the circumsolar dust ring) [ASL]
AZOb Jovian Dust Streams
AZOc Interstellar Dust Encounters by Spacecraft

March 22, 1903. An extraordinary split display of the zodiacal light. (British Astronomical Association, Journal, 13: 242, 1903.) [AZO3]

B BIOLOGY

BA ARTHROPODS
BB BIRDS
BF FISH
BH HUMANS
BM OTHER MAMMALS
BR REPTILES
BS AMPHIBIANS

PRIMARY SCIENCE SOURCES EXAMINED IN BIOLOGY

American Midland Naturalist (87 vols.)
American Museum of Natural History, Bulletin (40 vols.)
American Naturalist (158 vols.)
Auk, The (111 vols.)
Biological Bulletin (40 vols.)
BioScience (51 vols.)
Condor, The (53 vols.)
Creation/Evolution (20 vols.)
Evolution (53 vols.)
Human Biology (72 vols.)
Ibis (136 vols.)
International Wildlife (31 vols.)
Journal of Mammalogy (66 vols.)
Journal of Paleontology (40 vols.)
Journal of Theoretical Biology (40 vols.)
National Wildlife (39 vols.)
Natural History (formerly *American Museum, Journal*) (112 vols.)
Nature Magazine (52 vols.)
Quarterly Review of Biology (74 vols.)
Wilson Bulletin (45 vols.)
Zoologist (45 vols.)

BA ARTHROPODS[25]

BAA APPEARANCE AND MORPHOLOGY
BAB ARTHROPOD BEHAVIOR
BAC CHEMICAL PHENOMENA AMONG THE ARTHROPODA
BAE PALEONTOLOGICAL PROBLEMS AND THE ARTHROPODA
BAF ARTHROPOD BODILY FUNCTIONS
BAG ARTHROPOD GENETICS
BAI INTERNAL STRUCTURES
BAO ARTHROPOD ORGANS
BAT UNUSUAL CAPABILITIES OF ARTHROPODS
BAX UNUSUAL INTERFACES BETWEEN ARTHROPODS AND OTHER SPECIES

The arthropods include an immense diversity of invertebrates with jointed legs. Of these, the best known are the insects, spiders, and crustaceans. The number of arthropod species greatly exceeds 1 million; there may be 10 million or more in fact. Besides number, there is fantastic variety of form. Many species are polymorphic, existing in different forms or castes (the ants, for example). Furthermore, a species may metamorphize one or more times into wildly different forms, say, from larva to adult. Little wonder that the anomalist finds much of interest amidst the arthropod diversity and variability.

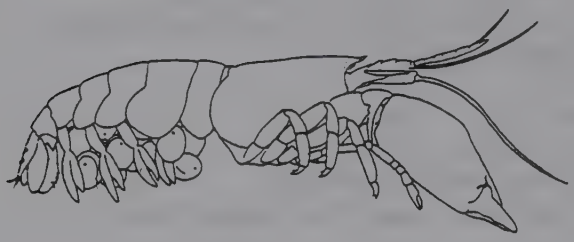
Other features of the arthropoda pertinent to this book include:

- Remarkable cases of mimicry of other arthropods, plants, and even bird droppings;
- Long-distance migration (i.e,; the navigation and flight of monarch butterflies to Mexico);
- The production of an amazing range of chemically complex poisons;
- The rapid development of resistance to pesticides;
- Communication via light, sound, vibration, and chemicals;
- The ability to construct sophisticated engineering structures (i.e.; ventilated termite mounds);
- In the fossil record, the sudden appearances of many species in fully developed forms and without (as yet) known predecessors.

Throughout this section on arthropods and indeed, this entire chapter, data selected from the science literature raise doubts about the ability of random mutation plus natural selection to produce the observed complexity and sophistication of all terrestrial organisms. Neodarwinism ("evolution") is widely assumed to be capable of explaining all claimed anomalies. In fact, neodarwinism---random change plus selection---can in principle explain just about anything. However, they may not be the complete answer to the origins of all species and all biological variation. Imbued with this suspicion, many of the anomalies claimed in this chapter challenge the evolution paradigm. It is possible that conventional "evolution" may be complemented or supplemented by such processes as hybridization and endosymbiosis, by epigenetic phenomena, and by biological phenomena that we have not yet recognized.

BAA APPEARANCE AND MORPHOLOGY

BAAa Extreme External Asymmetry (How is this rare phenomenon effected in bilateral animals?) (e.g.; as in the claws of some lobsters and crabs)



A soldier snapping shrimp with its huge "fighting claw." Overall length of animal: only about ½ inch. (Science News, 149: 759, 1996.) [BAAa]

BAAb Amazing Diversity of Arthropods (Several million species compared to a few tens of thousand vertebrates. Why the big difference?)

BAAc Number of Species in a Size Class Proportional to the Square Root of the Number of Individuals in the Class

BAAd Remarkable External Polymorphisms in Many Species
- d.1 Many Social Insects Have Workers, Drones, Soldiers, and Other Castes (What natural conditions favored the evolution of such pronounced polymorphisms?
- d.2 Diet-Induced Polymorphism (i.e.; larval diet controls adult form) (e.g.; some caterpillars, Nemoia arizonaria)
- d.3 Dominant Predator Determines Adult Form (e.g.; some water fleas)
- d.4 Precocious Female Larvae Kill Less-Developed Brother Larvae (e.g.; some wasps)
- d.5 Migratory Morphs (Animals destined to migrate often differ in size, shape, color) (e.g.; desert locusts)
- d.6 Mimicking Morphs (i.e.; when animals being mimicked exist in several morphs, so do the mimics) (e.g.; some tropical butterflies)

BAAe Sea-Spider Morphs (Normally 8-legged, three 10-legged morphs exist in three different genera, one 12-legger in another!) [BAAy]

BAAf "Fur-Covered" Crabs (At night some Galapagos crabs are covered by hordes of black flies, three-deep, reason unknown)

BAAg Incredible Beauty of Many Arthropods ("Beauty" as perceived by humans would not seem to have survival value. But perhaps arthropods also have an aesthetic sense) (e.g.; the jewel-like Beprestid beetles, peppermint shrimp, and so many of the butterflies and moths)

BAAh The "Warning-Colors" Evolutionary Quandry (When warning colors advertise a newly evolved poisonous insect, the mutants should be so few in number that naive predators will eliminate them regardless of taste.)

BAAi Complexity and Sophistication of Optical Phenomena Producing Colors in Pigmentless Insects (These are remarkable innovations.) [BRAae]
- i.1 Arrays of Multilayer Reflectors (e.g.; blue Morphos butterflies, which would otherwise be colorless.)
- i.2 Optical-Grating Wing Structures Disperse the Solar Spectrum
- i.3 Color-Mixing Cavities (e.g.; butterfly Papilo palinurus)

BAAj Many Insects "Colored" in the Ultraviolet (Not anomalous but exposes the poverty of human sensors and emphasizes our ignorance of an important part of visible nature.) (e.g.; orange sulphur butterfly)

BAAk Color-Changing Arthropods
- k.1 Daily Color Cycle Correlated with Cosmic-Ray Flux (A cosmic-ray sensor is implied.) (e.g.; fiddler crab) [BAFz, BABo]
- k.2 Prawn Turns Transparent Blue at Night, Various Colors Daytime (e.g.; Hippolyte)

BAAl Lateral Color Asymmetry (e.g.; occasional American lobsters)

BAAm Arthropod Pattern-Production Difficult to Explain (How are pigment-generating cells turned on and off systematically to create complex, variously colored patterns?)

BAAn Butterfly Patterns that Vary According to Environmental Conditions (Eyespots disappear in areas where predators are absent. How is this environmental condition introduced to the genome?) (e.g.; Bicyclus anynaua)

BAAo Independent Development of Similar Physiological Characters in Distantly Related Species (Large spines on the Saturniid moths)

BAAp Luminous Arthropods (Ants, termites, and other animals dwelling in the soil may acquire coatings of luminous bacteria or fungi. Below are a few of the more interesting self-luminous arthropods.)
- p.1 Claim of a Beetle with Flashing Eyes (e.g.; a Dytiseid beetle from Malaysia)
- p.2 Luminous Shrimp (e.g.; Systellaspis debilis)
- p.3 Electromagnetic Emissions at micron wavelengths (e.g.; from crab nerves)
- p.4 Emission of Oppositely Polarized Light from Right and Left Bioluminescent Organs (It is difficult to imagine any adaptive value here.) (e.g.; larvae of the firefly Photuris lucicrescens)
- p.5 Insects That Glow in Electric Fields (as in Thunderstorms) (e.g.; some ants, the moth Choristoneura fumiferana)

BAAq Arthropods with Remarkable and Often Bizarre Structures [BAGc]
- q.1 Insects with Immense, Apparently Useless Horns and Mandibles (e.g.; many beetles)
- q.2 The Stalkeyed Flies (Eyes and antennas are at ends of absurdly long stalks)
- q.3 High-Frequency, Dielectric Wave Guides on Antennas of Night-Flying Moths (Purpose is hard to discern here.) (e.g.; the Saturniids)
- q.4 Projections Arrayed on the Backs of Desert Beetles. (They condense moisture at night for drinking.) (e.g.; Stenocara) [BATy. BRAag]
- q.5 Ants with Second Huge "Communal" Stomachs for Storing Food (i.e.; "Physogastry") (e.g.; honeypot ants, some ants store other types of food)
- q.6 Some Moth Hair Is "Designed" to Absorb Bat Sonar Pulses (Another hi-tech development of nature!) [BABd]
- q.7 Male Spiders with Special Structures that Disable the Jaws of Dangerous Females (At least until after mating.) (e.g.; Hypomena bituberculata)

A rhinoceros beetle sporting a grotesquely long horn. [BAAq]

BAAr The Unexplained Origin(s) of the Great Variety of Insect Wings and the Repeated Development of Flight [BAEd, BATl]

BAAs The Existence of Insect Species with Both Flighted and Flightless Populations (Many island species have lost their ability to fly, not so with the same species on mainlands.)

BAAt Some Insect Species Shift between Flighted and Flightless Morphs Depending upon Season Temperature, and Food Supply (e.g.; corexid bugs, water-striders)

BAAu A Parasitic Fly Converts Itself into a Syringe and Injects Itself Bodily into Its Host (e.g.; Acrocera orbicula)

BAAv Mimicry in the Arthropoda (The complexity and accuracy of mimicry colors, patterns, and other physiological characters are often difficult to explain. A few spectacular and puzzling examples from thousands follow in BAAw-BAAah.)

Butterfly mimicry. Left and right members of the pairs are different species. Both colors and patterns are matched. (BioScience, inside front cover, March 1994.) [BAAv]

BAAw The Accuracy and Politics of the Claim that the Peppered-Moth Color Changes Are Proof of Evolution (Are the changes merely population shifts of the same species?)

BAAx The Renowned Monarch-Viceroy Butterfly Mimicry
- x.1 It Does Not Represent Batesian Mimicry as Long-Advertised
- x.2 Taste Tests Indicate Birds Find Both Species Distasteful [BAAah]
- x.3 Viceroy Mimics Butterflies Other Than the Monarch

BAAy Polymorphic Mimicry (Many Neotropic species appear in various colors and patterns, and their mimics can match these variations.) (e.g.; the mimicking genus Heliconius) [BAAd]

BAAz Remarkable Examples of Insects Mimicking Other Insects
- z.1 Legless, Wingless Female Flies Mimic Ant Larvae and Are Fed and Cared For by the Ants. (The males have legs and wings.) (e.g.; scuttle-fly)
- z.2 Beetles Mimic Ants So Accurately That They Can Parasitize Nest (Usually this involves somehow acquiring the nest odor.) (e.g.; Trichopsenius frosti)
- z.3 Pill Bug Mimicks Black Widow Spider
- z.4 Striped Wings of Snowberry Fly Mimic Zebra Spider to Deter Attacks

BAAaa Many Male Insects Mimic Females
- aa.1 To Steal Nuptial Offerings of Other Males
- aa.2 To Lure Other Males Away from Females They Just Mated
- aa.3 To Deter Attacks by Older Males

BAAab Remarkable Insect Mimicry of Plants and Their Flowers
- ab.1 The Wandering Leaf Phyllium siccifolium)
- ab.2 Larvae of Pine Tree Moth Build Cocoons Mimicking the Young Pine Cone

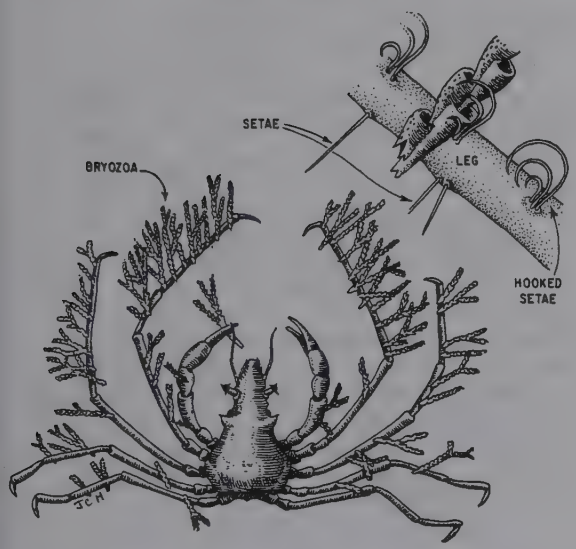
A "walking-leaf" insect. [BAAab]

ab.3 A Walking Stick (Timena cristinae) Is Polymorphic and Is Able to Mimic Two Plant Species as Required for Camouflage

BAAac Beetle Imitates Bird Droppings (These lure flies for the beetle's consumption.) (e.g.; Leistorophus versicolor)

BAAad Insects that Adorn Themselves to Resemble Prey and Make Their Approach Easier
ad.1 Assassin Bug Glues Termite-Nest Debris to Self
ad.2 Green Lacewing Larva Applies Aphid Wool to Self

BAAae Caddis-Fly Larvae Closely Resemble Aquatic Snails (Mimicry or convergent evolution?)



One of the decorator crabs that adorns itself with camouflaging debris. (Scientific American, 242:146, February 1980.) [BAAad]

BAAaf Variable Insect Mimicry
af.1 Butterfly Changes Appearance from Wet to Dry Seasons (To foil different predators) (e.g.; Orsotriena medus)
af.2 Butterfly Mimics Gall, Slug, or Leaf at Different Stages of Life (e.g.; purple emperor)

BAAag Firefly Flash Mimicry. How did these capabilities evolve?
ag.1 Photoris Females Mimic Flashes of Males of Other Species to Attract Them for Dinner
ag.2 Photoris Males Must Also Mimic Flashes of Other Species in Order to Find Their Females (The mimic is mimicked!)
ag.3 Photoris Males Also Emit Deceptive Flashes Sometimes (Purpose unknown.)

BAAah Questionable Evolutionary Value of Mimicry
ah.1 Tests Indicate That Even Cryptically Colored Moths Are Easily Found by Birds
ah.2 Tests Prove That Bright Warning Colors Are Not Important to Most Predators and May Actually Attract Them
ah.3 Some Insect Mimics Taste Just as Foul and Those Species They Mimic [BAAx]
ah.4 Some Eminently Edible, Brilliantly Colored Butterflies Are Very Successful (The value of mimicry is thereby questionable. (e.g.; black archers)

BAAai Extreme Diversity via Micro-Evolution. (e.g.; Hawaiian fruit flies (Drosophila) where 1 or 2 arriving species radiated to present 600-700 species. This biological radiation is more impressive than that of Darwin's finshes. [BBA17, BFEe]

BAAaj Extremely Rapid Microevolution (e.g.; Hawaiian banana moths feed only on bananas which were brought to Hawaii only 1000± years ago. Ditto for the checkerspot butterfly)

BAAak Repeated Adaptation of Land Insects to Aquatic Life. (Transition made by at least 100 species. Involves radical physiological changes.)

BAAal Uncertain Taxonomy of Velvet Worms (Onychphhora). (Are they truly arthropods? No one seems sure.

BAAam Extreme Sex Ratios (Present and essential in most social insects. Also occurs in other

species; e.g., the ratio of 100 females per male in the African butterfly Acraea encedon)

BAAan Loss of Stingers in Some Bees. (A seemingly poor adaptation from a human viewpoint, but a Darwinian explanation has doubtless been proposed.)

BAAao Unexpected Increase in Viability after Heavy Radiation Doses. (e.g.; fruit flies Drosophila)

BAAap Lack of Phenotype Changes Following Supposedly Significant Genome Changes. (e.g.; fruit flies Drosophila)

BAAaq "Reverse" Evolution (A reversion to original type.) (e.g.; as seen in fruit-fly experiments)

BAAar Inheritance of Acquired Characteristics (i.e.; Lamarckism) (e.g.; effects of temperature on Drosophila)

BAAas Crosse's "Accidental Production of Animal Life." (i.e.; mites produced by electricity, Acarus crossii) Of course, this controversial 1837 experiment was never replicated under sterile conditions.)

Some of the acari mites claimed to have been created electrochemically. (American Journal of Science, 1:32:374, 1837.) [BAAas]

BAAat Arthropod Sex Changes (e.g.; Caribbean crustacean that parasitizes fish.)

BAB ARTHROPOD BEHAVIOR

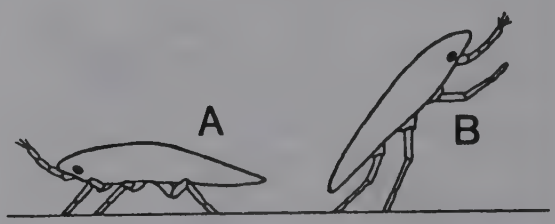
BABa Unusual Forms of Locomotion

a.1 Wheeling (The animal rolls up into ball or forms wheel and rolls away downhill.) (e.g.; wheel spiders, somersaulting shrimp Anomaloceris) [BMB16]

a.2 Swimming Underwater with Wings (e.g.; Wasp Polynema notans and others)

a.3 Tree-Climbing Coconut Crabs (Adaptation required acute observation and deduction followed by physiological adaptation to climbing.)

a.4 Wind-Dispersal (Tiny wingless arthropods capitalize on



(A) A scale insect (first instar phase) in the slow-moving atmospheric boundary layer. (B) Rearing up through the boundary layer it presents a high-drag section to the wind and is carried off to a new feeding spot. (Science, 223:1088, 1984.) [BABa]

boundary-layer velocity gradients.) (e.g.; Coccids)

a.5 Falling from Trees to Escape Predators) (e.g.; northern wood ants)

BABb Remarkable Insect Defense Techniques

b.1 Perimeter Clearing (Making a vegetationless ring around nest) (e.g.; African ant Cremato nigriceps)

b.2 Blockading Entrances of Rivals with Debris (e.g.; ant Novomesmesor cockerelli)

b.3 Cooking Nest Invaders (e.g.; Japanese honeybees cluster around invading

hornets and kill them by increasing their body heat.)
b.4 Fecal Defense (e.g.; tortise-beetle larvae form rings, anal hooks outward, waving feces at attackers)

BABc Curious Individual Defense Tactics
c.1 Tarantulas Fling Sharp Arrow-Like Hairs at Attackers
c.2 Velvet Worms Shoot Sheets of Liquid Adhesive
c.3 Water Beetles Sink Water Striders by Dispersing Detergents that Destroy Surface Tension

BABd High-Technology Insect Defense against Bats
d.1 Clicks Emitted to Jam Bat Sonar [BATae]
d.2 Presence of Body Hair That Absorbs Bat Sonar Pulses [BAAq]

BABe Insects Somehow Optimize Foraging Strategies (These can be complex and imply some sort of collective intelligence, although trial-and-error might have sufficed) (e.g.; ants and bees)

BABf Prey-Location Techniques
f.1 Beetles with Infrared Vision Detect Distant Forest Fires [BAOi]
f.2 Wasps Locate Caterpillars by Odors Released by the Plants They Eat (The odors are chemical signals evolved by the plants to "call" ants for help! An interesting mutualism!)

BABg Unusual Ways of Approaching Prey
g.1 Active Mimicry (e.g.; spiders hold up two of their eight legs to simulate insect antennas.)
g.2 Use of Lures (e.g.; assassin bugs wave dead termites)
g.3 Spiders Vibrate Webs of Spiders They Prey Upon (The prey suppose they have captured something to eat but get eaten themselves.)

BABh Novel Traps (Most spider webs excluded.) (e.g.; ant lions dig pits to trap ants)

BABi Unusual Methods of Capturing and Subduing Prey
i.1 Bola Spiders Lasso Prey
i.2 Some Spiders Spit Gum over Prey to Immobilize Them
i.3 Some Spiders Toss Webs over Prey
i.4 Pistol Shrimp Stun Prey with Sound [BATad]

BABj Bizarre Appetites
j.1 Vampire Moths Attack Deer, Tapirs, Humans, etc.
j.2 Tear-Drinking Moths Drink from Deer, Pigs, Elephants (Tears are actually very nutritious.) [BAXb]
j.3 Sweat Bees Consume Perspiration.

BABk Unusual Types of Murder among the Arthropoda (i.e.; excluding social-insect warfare, sexual cannibalism, as in the praying mantis)
k.1 Matriphagy (Young eat the mother.) (e.g.; Diaea ergandros and other spiders)
k.2 Queen Murder in Social Insects (New queens usually kill old queens; queens of parasitic species kill host queens.)

BABl Strange Collective Behavior
l.1 Curious Trains and Processions of Arthropods (e.g.; spiny lobsters, many caterpillars, some maggots and shrimp)
l.2 Circles (e.g.; spiny lobsters on defense; some caterpillars for no obvious reason)
l.3 Plumes over Trees (Probably a convection phenomenon, but they can be very impressive.) (e.g.; various species of insects)
l.4 Hilltop Swarms (A phenomenon probably related to BABl.3.) (e.g.; flies, butterflies)
l.5 Female Leks (i.e.; evidently a reaction to a lack of males (e.g.; African butterfly Acraea encedon)
l.6 Mass Gatherings (e.g.; sun spiders, king crabs in so-called "pods," krill swarms as large as 450 square kilometers by 200 meters thick)
l.7 Swarm and Flock Behavior (Army ants, nuptial flights, etc. excluded) (e.g.; gnat swarms in coordinated motion like some fish schools and

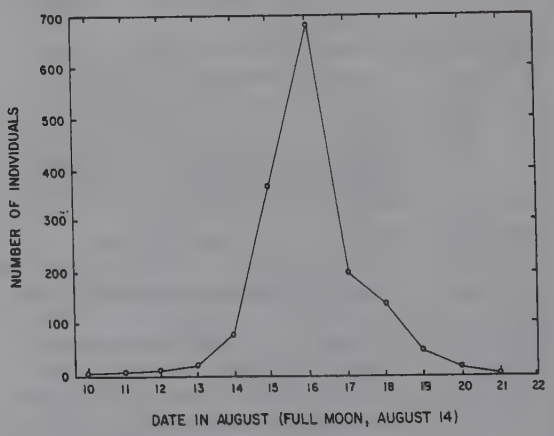
bird flocks.)
1.8 Collective Mimicry (Animal unite to simulate objects.) (e.g.; flattid bugs exist in two color morphs and can mimic plant with green buds and pink flowers; beetle larvae simulate female bees which promotes transfer of parasites)
1.9 Bee Battles (Pitched battles between honeybees and bumblebees---heaps of dead reported.)

BABm Migratory Phenomena
m.1 Immense Swarms (e.g.; one huge swarm of locusts seen 1,200 miles at sea; Monarch-butterfly swarms so dense that they stopped trains)
m.2 Long-Distance, Multi-Generation Migration (e.g.; Monarch butterflies, last generation of summer changes to migratory form, but five generations are required.)

BABn Arthropod Synchronies
n.1 Vocalizing in Cadence (Sometimes crickets sing in synchrony over many square miles.) (e.g.; crickets, katydids, etc.) [BSBj]
n.2 Rhythmic Mass Movements (e.g.; clusters of aphids, web-worm larvae, harvestmen)
n.3 Synchronous Claw-Waving (e.g.; fiddler crabs)
n.4 Ant Head-Knocking (Some species synchronously hit their heads against leaves and sticks for reasons unknown.)
n.5 Periodic Feeding Exoduses (e.g.; cave crickets)
n.6 Firefly Mass Luminous Displays (In Southeast Asia these displays stretch for miles, especially along rivers.)

BABo Behaviors Correlated with the Lunar Day (i.e.; 24.8 hours) [BAIb]
o.1 Color Changes (e.g.; fiddler crabs, even when in artificial 24-hour environment) [BAAk]
o.2 General Activity Level (e.g.; many crustaceans, including blind cave-dwelling crayfish, cockroaches, honeybees)

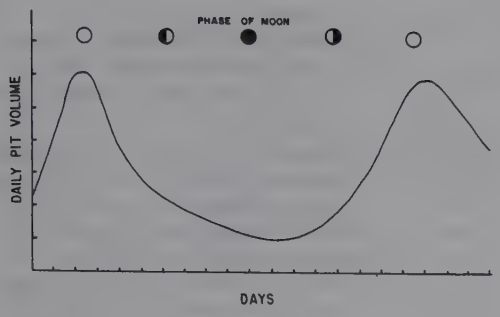
Spiny lobsters migrate in long "trains," presumably a defensive measure. (Natural History, 79:36, May 1970.) [BABl]



Moon-regulated emergence of an African mayfly. (Science News, 59:377, 1951.) [BABo]

BABp Behavior Correlated with Lunar Month
p.1 Pit-Digging Activity of Ant-Lion Larvae
p.2 Entomologists Can Collect Many More Insects during the New-Moon Week

BABq Eusocial Arthropods and Super-Organisms
q.1 General Theory of Super-organisms (e.g.; social insects and some crustaceans)
q.2 Taxonomic Diversity of Eusocial Arthropods (e.g.;



Ant-lion pit-volume versus lunar phase. (Natural History, 87:64, December 1978.) [BABp]

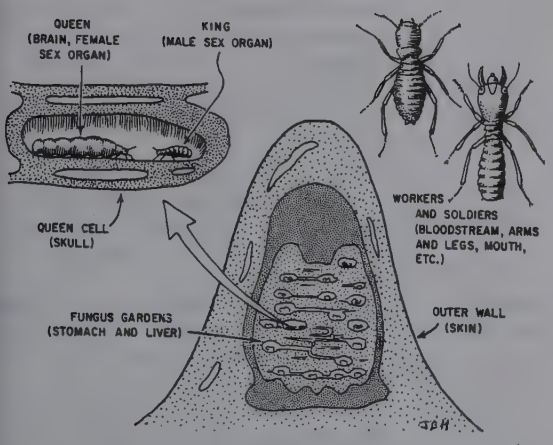
ants, bees, termites, beetles, spiders. thrips, shrimp

q.3 Immense Geographical Span of Some Superorganisms (i.e.; thousands of miles with many tolerant queens, billions of members)

q.4 Appearance of Collective Intelligence (e.g.; in the forays of army ants)

q.5 Existence of Widespread Communication Systems (e.g.; foraging ants) [BATt]

BABr Interesting Functions of Superorganisms


QUEEN (BRAIN, FEMALE SEX ORGAN)
KING (MALE SEX ORGAN)
QUEEN CELL (SKULL)
WORKERS AND SOLDIERS (BLOODSTREAM, ARMS AND LEGS, MOUTH, ETC.)
FUNGUS GARDENS (STOMACH AND LIVER)
OUTER WALL (SKIN)

Some termite mounds are so complex and their inhabitants so rigorously organized that the term "superorganism" is applicable. (New Scientist, 21:90, 1964.) [BABq]

r.1 Precise Nest Temperature Control (e.g.; termites)

r.2 Highly Organized Foraging Campaigns [BABq]

r.3 Gardening and Animal Husbandry (i.e.; of fungi, aphids)

r.4 Sex and Caste Control

r.5 Ant Slavery

r.6 Cyclic Activity (e.g.; the 26-minute cycle of ants)

BABs Arthropod Learning and Intelligence

s.1 Perception of Patterns and Symmetry (e.g.; by bees)

s.2 Recognition of and Capitalization on Systematic Phenomena (i.e.; regular changes of hive locations in science experiments)

s.3 Perception of Number (i.e.; as in counting of correct landmarks to food sources) (e.g.; bees, some butterflies and moths)

s.4 Sense of Time (As in prompt appearance at feeding times) (e.g.; bees, some butterflies)

BABt Apparent Inheritance of Acquired Characteristics

t.1 Acceptance of Distasteful Food (e.g.; stick insects) [BMB13]

t.2 Aversion to Some Substances (Drosophila)

t.3 Forced Changes in Pupation Structures In Experiments

BABu Inexplicable Submission to Weak Predators (e.g.; some spiders to some wasps, Arctusa perita to Pompilus plumbeos)

BABv Development of Husbandry (e.g.; ants tend aphids, caterpillars, etc.)

BABw Unusual Subterranean Insects (Excluding the Many Soil and Cave Denizens)

w.1 Mosquitos in Depths of Subway Systems [BAX2]

w.2 Insects Occupying Watertight Burrows (e.g.; salt-marsh beetle)

w.3 Arthropods Living in the Groundwater under River Beds (e.g.; many insects and crustaceans)

BABx Ant Collections of Unusual Objects

x.1 "Mineralogical" Ants (i.e.; their hills contain many tiny crystals---garnet, feldspar)

x.2 Bone Collections (i.e.; African harvester ants assemble bones of tiny animals about nests)

BABy Enigmatic Behaviors

y.1 Honeybee Queens Shake Workers for No Apparent Reason

y.2 Ants Attracted to Electrical Equipment (They sometimes clog such devices.)

BAC CHEMICAL PHENOMENA AMONG THE ARTHROPODA

BACa Venoms

a.1 The Incredible Variety of Complex Poisonous Chemical Substances Synthesized by a Broad Spectrum of Arthropods (This great variety is a biochemical challenge to evolution) (e.g.; various spiders, bees, wasps, caterpillars, etc.) (Venom diversity also seen in coneshells and some snakes.) [BRCd]

a.2 Venoms Deadly Only to Other Insects and Humans (Humans are not spider prey!) (e.g.; Australian funnel-web spider) (Coneshell venoms have same human specificity.)

BACb Chemical Mimicry of Hosts by Parasites (There are many examples to select from.)

b.1 Parasitic Beetle Myrmecophilus and Various Ants

b.2 Parasitic Wasp Matches Varying Chemical Signatures of Hosts

b.3 Some Caterpillars Synthesize Ant-Colony Scent (They thereby gain nest entrance and get nurtured by ants.)

BACc Manufacture of an Immense Range of Chemical Attractants, Usually Pheromones (These are complex chemical compounds and---hardly surprising---few of their evolutionary scenarios have been unravelled.)

c.1 Male Euglassine Bees Extract Female Attractant from Orchids

c.2 Bola Spiders Synthesize and Emit Moth Sex Pheromones (An example of chemical mimicry.)

c.3 Butterflies Extract Aphrodasiacs from Plants (Do some butterflies possess low libidos?)

BACd Astounding Variety of Chemical Signals [BATo] (e.g.; in the Danaus butterflies alone manufacture 214 types)

BACe Unusual Arthropod Blood

e.1 Blue Blood in Many Crustaceans (A blue copper-based oxygen carrier is employed instead of hemoglobin) (e.g.; crayfish, horseshoe crabs, etc.)

e.2 High Hemocyanin Concentration Found in Crabs That Live in Oxygen-Poor Water (e.g.; ocean-vent crabs at great depths)

BACf Defensive Chemicals: Existence of Many Hundreds of Different Repellants and Toxins and Various Types of Apparatus toDispense Them. [BACa]

f.1 Napthaline Fumigant Found in Termite Nests

f.2 Bombardier Beetle Sprays Hot Repellant with 500-Hertz Pulse-Jet by Combining Two Reservoirs of Chemicals

f.3 Exploding Termites (When nest is attacked, their muscles rupture their bodies, spewing sticky a substance) (Altruistic martyrs?)

f.4 Male Moth Extracts Offensive Chemical from Plants (During mating it wraps strands of it around mate to deter predators.) (e.g.; Cosmosoma)

f.5 Millipede Repels Ants with Hydrogen Cyanide Emissions (e.g.; Apheloma corrugata)

f.6 Explosive Defecation Repels Predators (e.g.; skipper caterpillar)

BACg Eating Specific Foods to Acquire Tastes Obnoxious to Predators

g.1 Monarch Butterflies Consume Milkweeds (They also synthesize other defensive chemicals. Nevertheless, some predators not deterred.)

g.2 Female Fireflies Consume Mates to Acquire Bad Taste

g.3 Defensive Fluids Extracted from Host Plants (In the case of sawfly larvae Neodi-

prion sertifer, a sticky resin deters predators.)

BACh Insects Disarm Plant Chemical Defenses
h.1 Caterpillar Helicoverpa zea Saliva Counteracts Plant Nicotine Production (This is its main chemical defense.)

BACi Complex Nature of Spider Silk (Orb-weaver silk core is covered with layers of tiny threads (nanofibrils), plus an inner membrane and an outer sheath. Spiders can generate up to 7 types of silk for different purposes. Silkworms, butterflies, and other insects are also silk producers. The evolutionary scenario of silk and the spinnarets that produce it is complicated by the fossil record indicating that spider silk preceded insects.) [BAEe]

BACj Presence of Ant "Butter" in Ant Colonies (Apparently this is made from resins collected from trees)

BACk Calcium Carbonate in Termite Mounds (This occurs even in mounds located on non-calcarous soils. Here, the source is unknown.)

BACl Element Transmutation by Arthropods (C.L. Kervran claims that lobsters use nuclear processes to create phosphorus and copper. This is a popular "fringe" topic!)

BACm Several Overwintering Insects Synthesize Glycerol as an Antifreeze (So do polar fish. Could the same genes be involved?) [BFCd]

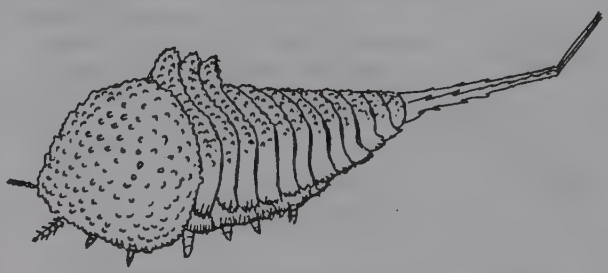
BACn Chemically Complex Anticoagulants Synthesized by Many Biting Arthropods

BACo Some Insect Colonies Change Their Characteristic Odor on a Daily Basis (Evidently as a countermeasure against parasites. Invaders with wrong "password" odor are killed.)

BACp Introduction of "Nerve Gas" to Ant Warfare (Slave-making ants release a gas that makes nest defenders fight each other instead of the slave-makers!) (e.g.; Harpagoxenus)

BAE PALEONTOLOGICAL PROBLEMS AND THE ARTHROPODA

BAEa The Strange Ediacaran Fauna. (The many arthropod-like animals in this 540-million-year-old fauna do not conform well with subsequent arthropods. The Ediacaran "experiment," seen best in Canada's Burgess shale, has often been described as "weird" and "bizarre.")



One of the many bizarre arthropods found in Canada's Burgess shale. (Natural History, 94:24, December 1985.) [BAEa]

BAEb The Sudden Appearance of Insects in the Fossil Record. (About 400 million years ago, at least 15 insect orders appeared, fully developed, differing but little from modern forms. We see few, if any, convincing predecessors.)

BAEc Great Diversity of the First Insects (The evolutionary relationships between the 15 orders are controversial. They appear distinct and far apart taxonomically.)

BAEd Sudden Appearance of Complex and Innovative Structures (There are few, in any, reasonable intermediate forms of most.)
d.1 Complex, Sophisticated Eyes (e.g.; the trilobites) [ABO2]
d.2 Sophisticated Wings (e.g.; dragonflies, 320 million years ago) [BAAr, BAT1]

BAEe Apparent Preadaptation among Arthropoda (Preadaptation is the development of characteristics before they have adaptive value.)
e.1 Spider Spinnarets and Silk Evolved before Insects [BACi]
e.2 Bees and Nectar-Feeding Flies Evolved before the Flowering Plants

BAEf Evolutionary Stasis of Many Arthropods over Hundreds of Millions of Years (Why no mutations and genetic drift over such immense time spans?) (e.g.; horseshoe crabs, pseudoscorpions)

BAEg Possible Late Survival of Supposedly Extinct Arthropods
g.1 Trilobite Fossil in Cretaceous Limestone
g.2 Trilobite-Like Tracks on the Modern Seafloor

BAF ARTHROPOD BODILY FUNCTIONS

BAFa Production of Giant Sperm (i.e.; relative to the size of the animal) (The expectation would be that more-numerous, smaller sperm would be more productive.) (e.g.; Drosophila sperm are 20 times body length)

BAFb Nutrient-Laden Sperm (i.e. for feeding progeny) (e.g.; bush crickets)

BAFc Sperm Wars
c.1 Male Inseminates with Sperm Bag (i.e.; bag extends tube into female sperm storage area and removes competing sperm) (e.g.; rove beetle)
c.2 Sperm Biochemically Suppresses Further Female Sex Drive (e.g.; Drosophila)
c.3 Sperm Accelerates Ovulation (i.e.; to deter fertilization in subsequent matings) (e.g.; Drosophila)
c.4 Sperm Flushes Out and Destroys Competing Sperm (e.g.; Drosophila)
c.5 Toxity of Sperm Causes Early Female Death (i.e.; precludes further matings)
c.6 Penile Structure Scapes Out Competing Sperm (e.g.; dragonflies)
c.7 Sperm Removed in BAFc.6 Stick to Penis and Fertilze Other Females "by Proxy" (e.g.; Tribolium castaneum)

BAFd Polymorphic Sperm
d.1 Short and Long Forms (e.g.; Drosophila)
d.2 Fertilizing and Nonfertilizing Forms (Latter form saturates system and delays remating) (e.g.; butterflies, Drosophila)

BAFe Female Selection of Sperm
e.1 Largest Selected (Taken as measure of male robustness) (e.g.; Utetheisa ornatrix)
e.2 Selection Depends upon Sperm Genotype (How the female detects this is not stated.) (e.g.; Drosophila)

BAFf Male Pierces Special Spot on Female Abdomen, Introduces Sperm into Body Fluids (The body fluids carry the sperm to the eggs. Sometimes this is a homosexual act.) (e.g.; bedbugs)

BAFg Rabbit Fleas Produce Fertile Eggs Only When Feeding on Pregnant Rabbit (This is so new fleas will be passed on to baby rabbits; but how do the fleas determine host pregnancy?)

BAFh Mites Hatch Inside Mother (Only one of the 15 or so is male; he fertilizes all his sisters and dies before they are born.) (Acarophenax triboli)

BAFi Tse-tse Flies Born Alive in a Hull Half the Size of Female (Infant burrows into ground with protective hull while development proceeds.)

BAFj Some Insects Can Switch to Parthogenesis (This is rare, even though all-female insects can still evolve via mutations.)

BAFk Succoring of Young
k.1 "Bee-bread" for Young (e.g.; mason bees)
k.2 "Suckling" of young (e.g.; cockroaches)
k.3 Active Defense of Young and/or Eggs by Adults (e.g.; many arthropods)

k.4 Broodpouch for Young (e.g.; the aptly named opossum shrimp)

BAFl Complexity of Metamorphosis (Three stages: larval, pupal, adult; essentially three different animals. Involves the repeated complete destruction of preceding stages and transformations to radically new ones.)

Adult and larval stages of a stag beetle. Could these radically different forms of the same species have had separate and different evolutionary histories? (Evolutionary History, 10:279, 1994.) [BAFl]

BAFm How and Why Was Metamorphosis Evolved? (It seems unnecessarily complex and clumsy.)

BAFn Puzzles of Periodical Cicadas
n.1 How Is Time Kept over the 13- and 17-year Cycles?
n.2 Genetic Evidence that 13-Year Broods Are Mutation of 17-Year Cicada
n.3 Four-Year Accelerations Not Uncommon in 17-Year Broods (These usually die out)
n.4 One-Year Decelerations Also Occur Rarely (Why do these anomalies occur?)
n.5 How Did Such Long Cycles Evolve from Annual Cicadas?
n.6 Odd 11-Year Brood Exists in Arizona (Note: 11 is also a prime number as are 13 and 17.)

BAFo Ability to Survive Near-Complete Dehydration (e.g.; tardigrades, chironomid flies)

A larva of a chironomid fly after being dried for 3 weeks (bottom). Same larva after 20 minutes of water-soaking. (New Scientist, 28:270, 1965. [BAFo]

BAFp Ability to Survive Complete Loss of Oxygen for Years (e.g.; brine shrimp)

BAFq Ability to Survive Freezing Temperatures by Synthesizing antifreeze [BACm]

BAFr The Only Sweating Insect (e.g.; a desert-dwelling cicada)

BAFs Nonbreeding Insects Live Longer (e.g.; Drosophila)

BAFt Death Rates Increase with Age (Advanced as significant, this seems only natural!) (e.g.; ants, Drosophila)

BAFu Lifespan Doubled by "Slightly" Disabling a Gene (e.g.; Drosophila)

BAFv Evolutionary Paradox: Natural Selection Should Increase Longevity But It Does Not

BAFw Electrical Charges on Bees and Beehives Varies in Circadian and Annual Cycles [BATag]

BAFx Insect Vampirism (In Adetomyrme colonies, adult ants cannot digest solid food although larvae can. Adults chew the larvae and drink their blood. Usually in such situations, the larvae regurgitate digested food for the adults.)

BAFy Referencing BAFx, in Termite Colonies the Cellulose-Digesting Larvae Produce Fecal Pellets to Feed Adults

BAFz Claim that Crab Metabolism Is Correlated with Cosmic-Ray Intensity [BAAk]

BAFaa Spawning Correlated with Full and New Moons (e.g.; crabs, crayfish)

BAFab Larval Transformation Triggered by Full and New Moons (e.g.; mosquitoes)

BAFac Ant Lions Have No Anus (They consume only predigested fluids sucked from prey.)

BAFad Krill Can Molt "Backwards" (They can return to the juvenile stages)

BAFae Recapitulation Does Not Occur in Insect Embryos (It seems to in mammals, but this is no longer an icon of evolution.)

BAFaf Soldier-Production Increases When Ant Colony Threatened (How threat-perception is turned into caste-production not understood) (e.g.; Pheidole pallidula)

BAFag Lack of Cilia (Cilia are hair-like structures on cells and otherwise ubiquitous in biology.) (e.g.; spiders and nematodes)

BAFah Promiscuous Insects Evolve Faster (i.e.; when females mate with many males.)(e.g.; seen in many species)

BAG ARTHROPOD GENETICS

BAGa Insect Globin Genes Lack Introns (i.e.; in contrast to globin genes in other animals) [BBG4]

BAGb Unusually High Frequency of Fertile Hybrids and Cross-Species Gene Flow (e.g.; some butterflies)

BAGc Extravagant Morphological Traits (Thought to be due to "selfish" genes that skew species sex ratio) [BAAq]

BAGd Presence of An Extra Chromosome That Destroys Paternal Chromosomes (e.g.; wasp Nasonia vitripennis)

BAGe Insects with Few Chromosomes
e.1 One Pair (e.g.; ant Myrmecia pilosula)
e.2 Single Chromosome Only (e.g.; false spider mite)

BAGf Butterfly Wing Patterns Are Varied by Genes That Served Other Purposes during Development

BAGg At Least Seventeen Species of Insects Defeat All Insecticides (This is unlikely to be the consequence of same random mutations in each species.)

BAGh In Social Insects, Queens Are Isolated from Environmental and Other Influences (How can natural selection be effected?)

BAI INTERNAL STRUCTURES

BAIa Presence of Magnetite and Possible Magnetoreceptors (e.g.; honeybees, butterflies, and others) [BATa]

BAIb Circadian Clocks Running on Lunar Times (24.8-hour days) (e.g.; crabs and other intertidal arthropods) [BABo]

BAIc Mystery of How Social Insects Transfer Immunity to New Pathogens throughout the Colony (e.g.; termites)

BAId Claim that Arthropods and Vertebrates Possess a Common Body Plan (But the dorsal-ventral axes are inverted.) (e.g.; Drosophila larvae resemble upside-down tadpoles internally)

BAIe Ability of Some Insects to Return to Feeding Sites Punctually (Learning ability and internal clock implied. (e.g.; red admiral butterfly)

BAO ARTHROPOD ORGANS

BAOa Complexity and Sophistication of Arthropod Eyes (The Neo-Darwinian scenarios for the

evolution of arthropod eyes is logically sound but seem intuitively inadequate. Of course, this is not a scientific complaint!) [BBO6, BHO1, BMO1]

BAOb Remarkably Early Appearance of Arthropod Eye Complexity and Sophistication (Trilobite eyes possessed doublet calcite crystalline lenses that eliminated spherical aberration. The fossil record shows no intermediate steps toward this level of sophistication.)

BAOc Two Common Types of Arthropod Eyes Are Scattered Unsystematically among Insects and Crustaceans (Called apposition and superposition types, their evolutionary scenarios are murky.)

BAOd A Few Arthropods Have Camera-Type Eyes (i.e.; lenses and retinas, phylogenetic origins unknown) (e.g.; jumping and wolf spiders, some copepods)

BAOe Some Insects Respond to Light When All Known Visual Receptors Are Covered (An undiscovered dermal light-sensor is supposed)

BAOf Some Insects Are Eyeless (We exclude here cave-dwelling species) (e.g.; Dorylmei army ants) (It is strange that these predatory surface-dwelling ants should have lost such a useful sensory organ.)

BAOg Some Insects, Especially Bees, Can See into the Ultraviolet (Since flowering plants evolved later, the surmise is that flower colors evolved to match their polinators' visual capabilities instead of vice versa. But why, then, did bees evolve excellent color sense in the first place? Preadaptation?)

BAOh Mantis Shrimp Eyes Possess 16 Visual Pigments (Humans have only 3. Why do shrimp need so many?)

BAOi Unique Sense Organs Permit Detection of Infrared Signals (e.g.; beetle Melanophila acuminata detects distant forest fires where prey will be abundant.) [BABf]

BAOj Eye Sensitivity Follows Circadian Rhythm in Some Species (e.g.; horseshoe crab, eyes 100 times more sensitive at night)

BAOk Shrimp with Two Infrared-Sensitive Organs on Back (e.g.; vent shrimp Rimicaris exoculata, otherwise eyeless)

BAOl Crustaceans with Usual Facet-Type Eyes Plus A Giant Facet on Back of Each Eye Providing Camera-Type Binocular Vision (e.g.; Dioptromysis paucispinosa)

BAOm Eyes Sensitive to Polarization of Sunlight (This feature provides directional information; i.e., a "sun compass") (e.g.; many bees, spider Drassodes cupreus) [BBT7]

BAOn Some Female Insects Eyes Are Infrared-Sensitive (They can thereby detect males that deliberately raise their temperatures to attract them.)

BAOo Insect Genital Organs Are Extraordinarily Complex and Bizarre (So much so that species are indentified by their copulatory organs. Male earwigs even possess two penises.)

BAOp Some Bees Have Helical Photoreceptors (These stabilize color-vision of environment. A reasonable evolutionary scenario here is hard to imagine.)

BAOq Honeybees Can Be Fooled by Optical Illusions (i.e.; Kanizsa's triangle) (The adaptive significance of this is not known.)

BAOr Genital "Eyes" (Rear-mounted photoreceptors guide copulation) (e.g.; some butterflies)

BAOs Some Insects Possess Additional 3 Frontal, Single-Lens Eyes (i.e.; used for orientation information)

BAOt Male Parasitic Insect Has about 1000 "Eyelets" (i.e.; each with a retina, providing for wide-area search for eyeless females) (e.g. Xenes peckii)

BAOu Some Crustaceans Have "Mirror" Eyes (i.e.; no lenses) (e.g.; ostracodes)

BAOv Eyes with Combination Lens and Mirror (e.g.; crab

Macropipus)

BAOw Insects with Bat-Sonar Detectors (e.g.; several moths, nocturnal butterflies, praying mantis)

BAOx Unique, Hyperacute Directional Hearing Organs (e.g.; fly Ormia ochracean, cricket Gryllus bimaculatus, bush-cricket Pseudotettiginia amaena)

BAOy Some Caterpillars Possess Lungs (Most insects breathe through their skins.) (e.g.; Calpodes ethlius)

BAOz Some Insects Dwelling Underwater Possess Tracheal Gills (e.g.; dragonfly larvae)

BAOaa Claim That Some Crustaceans Have Electric Organs (e.g.; some ostracoderms, purpose unknown.)

BAT UNUSUAL CAPABILITIES OF ARTHROPODS

BATa Insects with a Magnetic Sense (No one knows how this sense originates.) (e.g.; bees, termites, butterflies, etc.) [BAIa]

BATb Insects Sensitive to Gamma Rays (e.g.; ant Formica integra) [BMT4]

BATc Kin-Recognition Sense (This is probably chemical in nature, but must be highly discriminating in honeybee colonies containing a dozen or more subfamilies.)

BATd Ability to Sense When a Bird Feather is about to Be Molted (Somehow anticipating feather loss, mites move to a new feather in a timely fashion)

BATe Uncanny Ability of Ichneumon Flies to Locate and Lay Eggs on Prey Deep Inside Trees

BATf Remarkable Homing Ability of Far-Foraging Arthropods (Environmental cues are doubtless useful, but complex, somehow-optimized foraging patterns seem to be involved.) (e.g.; ants, honeybees, spiny lobsters)

BATg Ability of Millions of Monarch Butterflies to Migrate to Same Mexican Trees Used by Their Ancestors (5 generations removed) (Various navigational methods have been proposed, but it is unknown how route cues are passed between generations. (Note: other mass-migrators are painted-lady butterflies) [BMT2]

BATh Some Butterflies Migrate in "Wrong" Directions (e.g.; cabbage butterfly Pieris monuste migrate south in the spring in Florida)

BATi Ability of Deep-Sea-Vent Crustaceans to Appear at Newly Opened Vents Hundreds of Kilometers from Colonized Vents

BATj Controversial Origins of Insect Wings and Power of Flight (Insect wings exist in many forms.) (See BBT13 for discussion of the evolution of flight.) [BAAr, BAEd, BATl, BMA41, BREg]

BATk Assertion by Experts That Insect Flight Cannot Be Explained by Conventional Aerodynamic Principles

BATl Insect Flight Appeared Suddenly and Well-Developed in Fossil Record [BAAr, BAEd, BATj]

BATm Remarkably Rapid Wing Beats (e.g.; midges, 2,250 beats per second, which accounts for their whining sound)

BATn "Flying" Crustaceans (These animals utilize fan-shaped legs after the fashion of "flying" frogs.) [BSAi] (e.g.; the copepod Pontellina mediterranea)

BATo The Immense Number and Variety of Communication Chemicals Synthesized by Insects (Were these thousands of complex substances evolved through random mutations and natural selection?) [BACd]

BATp Controversial Explanations of the Evolution of Bee-Dance Languages (Bee brains claimed to be too small to possess these elaborate, abstract languages)

BATq Undeciphered Meaning of the Dances of Some Bee Drones) (e.g.; A. andreniformis)

BATr Honeybee Dances Are Accom-

A "flying" crustacean (a copepod). (Scientific American, 72:347, 1895.) [BATn]

panied by Acoustical and Vibrational Signals (These have not been translated.)

BATs Some Interesting Examples of Arthropod Acoustical Communication (Mate attraction excluded.) [BMT9]

- s.1 Unpalatable Moths Emit Acoustical Warnings to Bats (Equivalent to color warnings of poisons and bad tastes. The joint evolution of this unpalatability and associated sound-production equipment is hard-to-explain.)
- s.2 Ants Use Sound for High-Priority Colony-Wide Signals
- s.3 Some Butterfly Caterpillars Attract Ant Guardians with Acoustical and Vibrational Signals (e.g.; Lyeaenoids)
- s.4 Sounds Used For Insect Territory Announcements (e.g.; hooktip-moth caterpillars)
- s.5 Unusual Use of Water Vibrations for Communication (i.e.; wavelets) (e.g.; water-striders)

BATt Existence of Elaborate Distributed Communication Networks (Various media used.)

- t.1 Networks Used by Foraging Ants (As is well known the discovery of food by one forager quickly brings large numbers of ants with alacrity that is amazing.)
- t.2 Butterfly Communication Networks (These have been inferred from observations at honey-feeding stations)
- t.3 Termites Consuming a Wood Structure Communicate Acoustically

BATu Arthropod Use of Tools

- u.1 Ant Lions Throw Grains of Sand to Better Subdue Captive Ants
- u.2 Weaver Ants Use Their Silk-Producing Larvae to Sew Nest Leaves Together (e.g.; Oecophylla smaragdina)
- u.3 Some Ants Use Pieces of Leaves to Carry Soft Food to Nest (e.g.; Myrmicina ants)
- u.4 Some Ants Carry Prey Body Fluids to Nest in Naturally Spongy Material (e.g.; Aphaenogaster)
- u.5 Digger Wasps Tamp Burrow's Earthen Entrance with Small Stones (e.g.; Ammophila)

BATv Unusual Arthropod Structures (excluding beehives, tunnels, holes, ordinary spider webs, woven ant nests, etc.) [BBT28, BMT12]

- v.1 Giant, Air-Conditioned Termite Mounds Oriented to to Minimize Solar Heating (Such "magnetic" mounds occur in Australia.)
- v.2 Protective Shelters Built for "Domesticated" Insects and Paralyzed Prey (e.g.; Australian Spinifex ants for "farmed" sap-suckers, African wasp Eumenes emedei for paralyzed prey)
- v.3 Hornet-Comb Cells Each Adorned with a Crystal of Ilmenite (No explanation for this strange practice.) (e.g.; Vespa orientalis)

An Australian "magnetic" termite mound. These mounds are actually oriented to minimize solar heat input. (Nature Magazine, 40:415, 1947.) [BATv]

v.4 Large Systems of Sea-Floor Tunnels (e.g.; shrimp Callianassa truncata)

v.5 "Termite Bands" (Kilometer-long ridges 2 meters wide) (e.g.; African termite Odontotermes)

BATw Fungal Gardens (e.g.; leaf-cutter ants, some termites) (How did this mutualism evolve?)

BATx Ability to Tunnel through Metal (e.g.; wasp Silex gigas)

BATy Construction of Fog-Catchment Trenches in Desert (e.g.; beetle Lepidochora) [BAAq, BMT12]

BATz Construction of Bridges from Surrounding Materials to Reach Food (e.g.; Formica rubra)

BATaa "Decorated" Spider Webs (These resemble flowers in ultra-violet light and attract insect prey.)

BATab Construction of Underwater Nets to Trap Prey (e.g.; caddis-fly larvae)

BATac Construction of Silken Rafts (These are used to punt across still ponds to catch small basking fish.) (e.g.; wolf spiders)

BATad Ability to Generate Sounds Powerful Enough to Stun or Kill Prey (e.g.; pistol shrimp, snapping shrimp Alpheus heterochaelis) [BABi]

BATae Acoustic Jamming of Bat Radar (e.g.; moth Arctiidae) [BABd]

BATaf "Singing" Ants

BATag Sensitivity to Electric Fields (i.e.; agitation displayed in the lab and near thunder-storms) (e.g.; honeybees) [BAFw]

BATah Claim That Some Insects Produce Effect Similar to Electric Shock (e.g.; West Indies wheelbug Redivivus genatus, a South American caterpillar)

BATai Ability to Interpret Weak Acoustic Signals in a Noisy Environment Using Stochastic Resonance (e.g.; crayfish)

BATaj Apparent Mysterious Transfer of Huge, Helpless Ant Queen to New Cell (Queen is too big for lifting, cell doors too small)

BATak Survival of Huge Doses of Nuclear Radiation (e.g.; cockroaches) [BMGc]

BAX UNUSUAL INTERFACES BETWEEN ARTHROPODS AND OTHER SPECIES

BAXa Humans (Excluded here are the many diseases and parasites transferred to humans by insects. The focus is on more bizarre and improbable interfaces.)

a.1 Botflies. (Years ago botfly larvae were used medicinally to clean wounds of pus and dead tissue. Curiously, their excrement acted as a dis-infectant)

a.2 Subterranean Mosquitoes Mosquito C. pipens normally preys mainly on birds, but those living deep in London's Underground tunnels prefer humans to the rats and other subway denizens.) [BABw]

BAXb Other Mammals
- b.1 Fleas (When a mammal's body temperature rises due to disease, fleas abandon it. Humans included.)
- b.2 Moths (Several species of moths subsist on mammalian tears, which they encourage by irritating the eyes.) [BABj]

BAXc Birds
- c.1 Praying Mantises (Hummingbirds fall prey to this large insect)
- c.2 Flower Mites (Hummingbirds unintentionally transport these tiny insects between flowers. Of course, it is all intentional from the mites' standpoint.)

BAXd Amphibians (Frogs are sometimes seen in the nests of leaf-cutter ants. For unknown reasons, these insects will sometimes maintain a deep underground chamber filled with water. It is occupied by tadpoles which are fed by the ants.)

BAXe Fish
- e.1 Reef Fish (Several species of shrimps and crabs clean the reef fish of parasites.)
- e.2 Various Fish (A parasitic isopod consumes a fish's tongue, anchors itself there, and takes over its functions, stealing food the while.)

BAXf Other Arthropods (A sampling of many curious interfaces, most of which must have involved interesting evolutionary scenarios.)
- f.1 Ants and Butterfly Caterpillars (Caterpllars secrete food for ants in return for protection. Some caterpillars actually call ants to them acoustically. Many similar symbiotic relations exist between ants and other insects.)
- f.2 Wasp Larvae and Spiders (Some larvae parasitize spiders. After consuming much of their bodies, they force them to build webs that will support their coccoons as the spiders' final act.)
- f.3 Wasps and Aphids (When parasitic wasp lays its egg on an aphid, the latter often jumps to its death to minimize wasp attacks against its species. Altruism?)
- f.4 Parasitic Flies and Crickets (Flies Possess Unique Hearing Organ to Locate Male Crickets)
- f.5 Antbutterflies (Ithomiinae) Follow Army Ants (They feed on the dropping of the ant birds that also attend the army-ant foray.)
- f.6 Mites and Drosophila (Unexpected evidence of horizontal gene transfer from mites to the fruit flies.)
- f.7 Cuckoo Bees (Psithyrus rupestris) and Red-Tailed Bumblebees (Bombus lapidarius) (The former invade bumblebee nests, usually unchallenged, and lay their eggs. Their eggs and young are then reared by the host.)
- f.8 Parasitic Wasps and Many Insects (Wasp stings host in exactly the right spot to paralyze it. Wasp lays egg on host. Its larva eats host dodging vital organs to keep it alive.)
- f.9 Deaths-Head Hawkmoth and Honeybees (Hawkmoth produces curious sound, enters hives unmolested and drinks honey.)

BAXg Plants and Fungi (Besides ant and termite gardens, many other mutualisms exist. How these highly specific situations evolved is hard-to-explain.)
- g.1 Wasps and Figs (The various species of figs are each pollinated by their own species of wasp, which uses the fig as a larval incubator.)
- g.2 Moths and Yucca (Again, a highly specific arrangement; the yucca provides food for the moth larva which pollinate the plant.)
- g.3 Ants and Trees (A multitude of examples exist in which the trees provide food for the ants while being protected by the fierce insects.)

BAXh Invertebrates
- h.1 Barnacles (Crustaceans) and Bryzoans (A strange symbiotic integration of the hard-

bodied crustacean and the soft, plant-like bryzoan. Barnacle gets camouflage, bryzoan avoids burial on reef.)

h.2 Crabs and Sea Anemomes (e.g.; Epagurus prideauxi and Adamsia) (Crab gets camouflage and anemome's stinging defense, anemome gets some of crab's food.)

h.3 Copepods and Salps (The crustaceans clean the salps, which are marine colonial organisms that get clogged up with plankton. The plankton is food for the copepods.)

BAXi Microorganisms (A few selections from thousands, some symbiotic, some parasitic.)

i.1 Bacteria (Fungus-growing ants apply antibiotic-producing bacteria to control parasites in their gardens.)

i.2 Protist (Mixotricha paradoxa) (This microorganism lives in termite guts but is itself comprised of thousands of smaller life forms, such as bacteria. The protist enables termites to digest wood.)

i.3 Bacterium (Wolbachia) (These bacteria skew the sex ratios of some insects by killing male eggs. Rationale: only female eggs will transmit the bacteria to the next generation.)

i.4 Sea Snails and Amphipods (The crustaceans kidnap and hold the foul-tasting snails to deter predators.)

i.5 Other Arthropods (Rootheads, Rhizocephala, related to barnacles, inject themselves into crabs and take over control, turning males into females. All such parasitized crabs produce eggs, but they are the eggs of the rootheads.)

i.6 Sheep-Liver Trematode (Dicrocoelium dendriticum) (This sheep-parasite's life cycle includes a stage in which it infects ants. To increase the chances of infected ants getting eaten by sheep, the trematode burrows into the ants' brains somehow inducing them to climb to the tops of grass stalks.)

BB BIRDS[18]

BBA	EXTERNAL APPEARANCE AND MORPHOLOGY
BBB	AVIAN BEHAVIOR
BBC	AVIAN CHEMICAL PHENOMENA
BBD	DISTRIBUTION OF BIRDS IN TIME AND SPACE
BBE	THE AVIAN FOSSIL RECORD
BBF	AVIAN BODILY FUNCTIONS
BBG	AVIAN GENETICS
BBI	INTERNAL STRUCTURES AND SYSTEMS
BBO	AVIAN ORGANS
BBT	UNUSUAL TALENTS AND FACULTIES
BBX	AVIAN INTERFACE PHENOMENA

Today's biologists are quite certain that the birds evolved from small dinosaurs. This claimed transformation necessitated some remarkable biological reengineering:

- The development of several kinds of feathers, not only those specially configured for flight, but "afterfeathers," "powder" feathers, etc.;
- The invention of a radically new respiratory system unlike anything seen in any of the other animals;
- The design of light-weight, yet-very-strong, skeletons; and
- The creation of a unique sound organ, the syrinx, which permits birds to entrance us not only with sophisticated melodies but allows the production of two or more nonharmonically related tones simultaneously.

In short, birds are much more than mere feathered dinosaurs.

We also see in the avian world many anomalies and curiosities worth mentioning: inheritable callosities (Lamarckism); incredible mimicry of appearance, voice, and behavior; and astoundingly long migrations of naive young birds flying without adults, implying the genetic transfer of immense quantities of navigational information. Also, in the realm of genetics, birds have (unaccountably) managed to discard virtually all introns or "junk" DNA from their genomes.

BBA EXTERNAL APPEARANCE AND MORPHOLOGY

BBA1 Remarkable External Avian Asymmetries
- 1.1 Male on One Side, Female on the Other (Gynandromorphism)
- 1.2 Ears (i.e.; for pinpointing prey) (e.g.; owls)
- 1.3 Bills (e.g.; the Wrybill) (Side-curved bill used for turning over stones.)
- 1.4 Left Ovaries Only (e.g.; most but not all female birds) [BBO8]

BBA2 Female Hawks Larger Than Males (Over 20 explanations offered!)

BBA3 Skewed Sex Ratios of Offspring (Usually significantly more males are fledged)

BBA4 Possible Anomalies Associated with Vividly Colored and Highly Patterned Avian Plumages and Ornaments [BBA9, BBA10]
- 4.1 Owl Ear Tufts Claimed to Have No Apparent Purpose
- 4.2 Bright Plumage Correlated with Parasite Control (Females prefer brightly colored males who are less likely to

be parasitized.)
4.3 Conspicuous Birds Tend to Be Unpalatable [BBC2]
4.4 The Peacock's Tail and Evolutionary Illogic (Why are females strongly drawn to male characters that make them such easy prey?)

BBA5 Plumage Polymorphism (Here we exclude color "phases.") (e.g.; Ruffs and parasitic Cuckoos)

BBA6 Females with Male Plumage (i.e.; a female in a male-less chicken flock may assume male plumage)

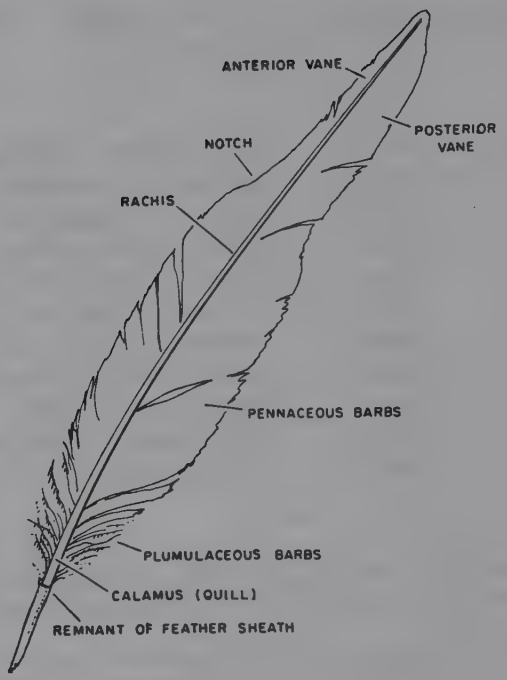
BBA7 Molting of Natal Down before Hatching (The chicks emerge from the egg ready to fly.) (e.g,; some megapodes, such as the Brush Turkey)

BBA8 Striking Diversification and Pattern-Conservation in Plumage (An example of each phenomenon follows.)
8.1 Interspecies Variation (e.g.; New Guinea's Variable Pitohuis)
8.2 Recurring Characters in Several Species (e.g.; Mallard neck ring)

BBA9 Complexity and Sophistication of Feather Characteristics
9.1 Feather Pigments (It is difficult for Neodarwinism to account for the synthesis of the multitudinous feather pigments.) [BBE5]
9.2 Mechanism of Production of Colored Patterns (How is pattern information coded and applied during feather growth? How is this large block of information transmitted genetically?) [BBA10]
9.3 Origin of Information Content of Colored Patterns
9.4 Evolution of Beauty in Birds (Does this aesthetic human-determined character have survival value?)

BBA10 Complexity and Sophistication of Feather Color-and-Pattern-Generation Mechanisms and Their Organism-Wide Control (Neodarwinism can explain anything, but here these explanations are strained!)

BBA11 Unusual Plumage-Color Changes
11.1 Change Due to Food (e.g.; pepper turns canaries orange)

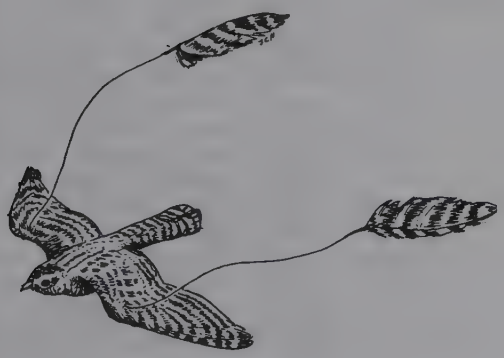


A typical avian flight feather. Its shape is guided by aerodynamic requirements. Hooklets (not shown) and barbs hold the feather together. (N.S. Proctor and P.J. Lynch; Manual of Ornithology, 1993.) [BBA9]

11.2 Claim That Fright Can Turn Feathers White
11.3 Birds That Are Not Color-fast (Rain removes the pigments.) (e.g.; Turacos)
11.4 Albinism (e.g.; robins and probably all species))

BBA12 Feather Curiosities
12.1 Afterfeathers (In some species, contour feathers are doubled by attached afterfeathers.) (e.g.; in some pheasants)
12.2 Powder Feathers (These feathers possess barbs that disintegrate into fine powder. They are never molted.) (e.g.; some herons and bitterns)
12.3 Silent Feathers (The product of special aerodynamic features.) (e.g.; owls)
12.4 Feathers As Defensive and/or Offensive Weapons (A bit like porcupine quills)

(e.g.; some trogons and pigeons)
12.5 Extremely Long Trailing Feathers ("Standards") Present during Breeding Season (e.g.; Standard-Wing Nightjar)
12.6 Unwaterproofed Waterbirds (An evolutionary oversight?) (e.g.; Frigatebirds)
12.7 Waxy Feathers (Purpose unknown.) (e.g.; Cedar Waxwings)



During the breeding season both sexes of the Standard-Wing Nightjar display long, trailing "standards." (Scientific American Supplement, 85:245, 1918.) [BBA12]

BBA13 Neoteny in Feathers (Neoteny is the retention of juvenile characteristics in the adults.) (e.g.; the Ostrich and other flightless birds) (Is this reverse evolution?)

BBA14 Tooth Substitutes in Modern Birds (e.g.; serrated bills, hooked bills)

BBA15 Birds Lacking Egg Teeth (The chicks usually kick their way out of their shells.) (e.g.; megapodes and the Ostrich)

BBA16 Extreme Sexual Dimorphism in Bills (e,g,; the Huia)

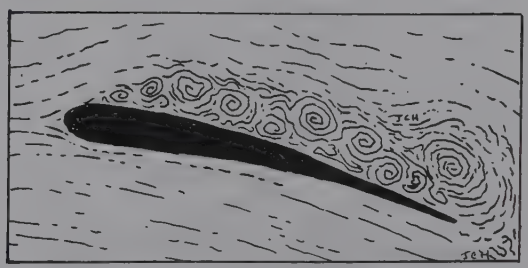
BBA17 Bill Polymorphisms
17.1 Intraspecies (e.g.; European Oystercatchers)
17.2 Intragenus (e.g.; crossbills)
17.3 Intratribe (e.g.; Darwin's finches)

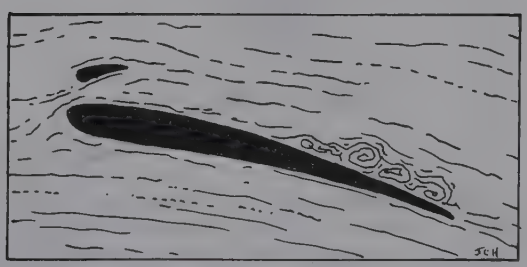
BBA18 Avian Bills: Unusual Adaptations
18.1 Unusual Specialized Bills (e.g.; the Wrybill, skimmers, honeyguides, etc.))
18.2 Spectacularly Showy Bills (e.g.; puffins, toucans)

BBA19 Wing Claws (e.g.; finfoots, young Hoatzins)

BBA20 Wing Spurs (Used in fighting.) e.g.; screamers, Spur-winged Geese)

BBA21 The Alula or Bastard Wing (An example of aerodynamic sophistication. It increases lift at low flight speeds. One must wonder how such innovations arise, even when Neodarwinism can, in principle, produce such engineering advances.)



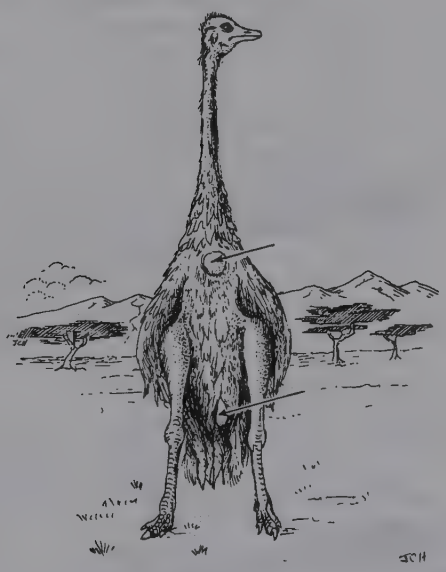


In some birds, a special tuft of feathers called the "alula" reduces turbulence and increases lift. (Top) no alula; (Bottom) alula in place. (Discover, 18:60, January 1997.) [BBA21]

BBA22 Some Curiosities of Avian Feet
22.1 Decorative Feet (e.g., finfoots, which are water birds rarely displaying their feet.)

22.2 Toe Curiosities (There are three radically different toe arrangements in the avian world.) (e.g.; only the trogons of the New World possess heterodactyl feet, most birds have anisodactyl feet)
22.3 Waterbirds without Webbed Feet (e.g.; dippers)
22.4 Incubator Feet (Such feet are well supplied with warm blood.) (e.g.; cormorants, pelicans, etc.)

BBA23 Inherited Callosities (e.g.; the Ostrich) (This feature is claimed to be "acquired" and an example of Lamarckism.)



The arrows indicate two prominent callosities on the Ostrich. Somehow these acquired characteristics have been incorporated into the genome. (American Naturalist, 54:289, 1920.) [BBA23]

BBA24 Unusual Pouches on Birds
24.1 For Carrying Young (e.g.; finfoots)
24.2 For Incubation (e.g.; Emperor Penguins)
24.3 For Carrying Food (e.g.; dovekies, crossbills)
24.4 For Display (e.g.; Pectoral Sandpipers)
24.5 Purpose Unknown (e.g.; Maribou Storks)

BBA25 Luminous Birds (Usually such birds have been in contact rotting wood or bioluminescent marine organisms) (e.g.; owls, terns)

BBA26 Extremely Odoriferous Birds (e.g.; Hoopoes, Hooded Pitohuis)

BBA27 Egg Complexity and Sophistication (The shell alone is a multilayered life-support system.)

BBA28 Bird Eggs: Color, Pattern and Size Curiosities
28.1 Birds That Lay Eggs with Variable Colors and Patterns (e.g.; Common Murres)
28.2 Egg Color Correlated with Its Edibility (Cryptic birds ---dull colored---tend to lay cryptic eggs, which tend to be the most flavorable.)
28.3 Eggs Colored on the Inside of the Shell (e.g.; cassowaries) (The advantage of this has never been figured out!)
28.4 High Egg/Body-Weight Ratio (e.g.; Kiwis)

BBA29 Egg Mimicry
29.1 Eggs That Mimic the Host Eggs (e.g.; the eggs of many cuckoos)
29.2 Eggs That Mimic Different Environments (e.g,; Yellow-Wattled Lapwing lays eggs that match different soils)

BBA30 Birds That Mimic Other Species or the Environment
30.1 Environment (e.g.; Lava Gulls)
30.2 Females (e.g.; subadult male Purple Martins)
30.3 Flock Mimicry (i.e.; birds that forage in mixed flocks) (e.g.; flocks in New Guinea led by the poisonous pitohuis)
30.4 Predatory Birds (e.g.; orioles mimic friarbirds)
30.5 Benign Birds (e.g.; hawks mimic Turkey Vultures)
30.6 Parasitic birds Mimic Hosts (e.g.; Drongo Cuckoos mimic Bronzed Drongos)
30.7 Parastitic Chicks Mimic Host Chicks (e.g.; Koels, Whydahs, etc.)
30.8 Rodents (e.g.; Purple Sandpipers mimic rats)

Eggs on left: Garden Warbler; Reed Warbler; White Wagtail. Eggs on the right, mimics laid by the Common Cuckoo. (L.L. Short; The Lives of Birds, 1993.) [BBA29]

BBA31 Remarkable Convergences of Appearance and Habits among Distantly Related Species (e.g.; Eastern Meadowlark and African Yellow-throated Longclaw)

BBA32 Frightmolt (e.g.; we have a pertinent Cardinal anecdote)

BBA33 The Curious Hollow in the Back of the Young Common Cuckoo (It is used for ejecting eggs of the host bird)

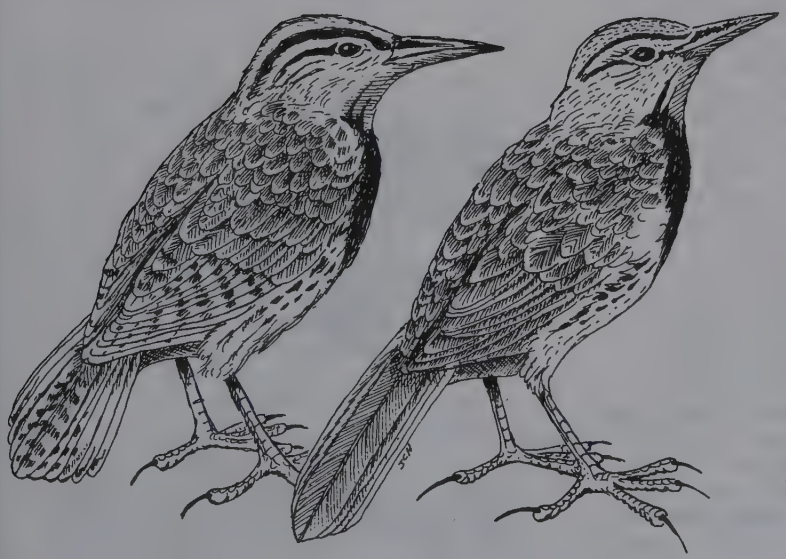
BBAa Argentine Lake Duck Has Penis Longer Than Its Body (It attracts females of its own and other species.)

BBAb Many Dull-Colored Males Not Eliminated by Natural Selection

BBAc Ultraviolet Fluorescence in Birds (e.g.; Budgerigars) [BBAg]

BBAd Last Eggs in Some Species Are Markedly Duller (Is this a signal to parasitic birds that incubation is in progress and that parasiting the nest would be in vain?) [BBAh]

BBAe Existence of "Ring Species" (These are usually circumpolar species that vary slightly with longitude and often grade into nonbreeding birds at point of closure.)



Convergence of appearance in distantly related species. (Left) Eastern Meadowlark of North America; (Right) African Yellow-Throated Longclaw. Colors are also almost identical. (N.S. Proctor and P.J. Lynch; Manual of Ornithology, 1993.) [BBA31]

BBAf Bills and Songs of Darwin's Finches Change with Environmental Conditions (Do these "icons of evolution" differ enough to be deemed separate species?)

BBAg Handsomer Males Sire More Sons (e.g.; Blue Tits with ultraviolet flourescence) [BBAc]

BBAh First Egg of Erect-Crested Penguins Is Small, Green, and Neglected (Only second large, white egg is incubated. Purpose of first egg is an enigma.)

BBB AVIAN BEHAVIOR

BBB1 Avian Intelligence
- 1.1 Pertinent Anecdotes (e.g.; honeyguides enlisting other species in gathering honey.) [BBX4]
- 1.2 Laboratory Experiments (e.g.; Grey Parrots, "Alex" in particular)
- 1.3 Anecdotes of Bird Stupidity (e.g.; Acorn Woodpeckers)

BBB2 Complexity and Sophistication of Avian Mental Processes
- 2.1 Learning Experiments and Anecdotes (e.g.; Grey Parrots, House Sparrows)
- 2.2 Counting Experiments (e.g.; Jackdaw abilities)
- 2.3 Memory (e.g.; field observations of Clark's Nutcrackers retrieving buried nuts)

BBB3 Four Enigmas of Instinct
- 3.1 Origin of Instinct Complexity and Sophistication
- 3.2 Negative Survival Value of Some Instincts (e.g.; Jackdaw attacks on black objects) (At least, we humans can discern no value in these strange reactions.)
- 3.3. The Half-An-Instinct Problem (e.g.; tailorbird nest construction, which requires a whole suite of interlocking operations)
- 3.4 Unknown Genetic Mechanism for Transmission of Instincts and Data Bases to Progeny (e.g.; especially the immense quantities of information required for navigation during migration) (This is particularly true for newly fledged birds migrating without parental guidance.)

BBB4 Anomalous Altruism Is Hard to Find (Most pertinent anecdotes ultimately yield to selfish interpretations.)

BBB5 The Aesthetic Sense in Birds (What adaptive value could be attributed to this?) (e.g.; bowerbird decorations)

BBB6 The Use of Calculated Deception (i.e.; birds that cry "wolf") (e.g.; Great Tits, White-Winged Shrike-Tanagers, etc.)

BBB7 Avian Play (Such behavior contradicts the paradigm that birds are mere automatons.) (e.g.; crows, ravens, bald eagles, etc.)

BBB8 Anomalous Aerial Tumbling and Erratic Flight (e.g.; tumbler-pigeons, Common Ravens, Black Brant)

BBB9 Leks: Communal Display Areas (Used mainly for courtship. Why did they evolve?)

BBB10 Cooperative Displays on Leks (What is the origin of the complex gymnastics and vocalizing observed at leks? Such is not required by most species.)

BBB11 Enigmatic Dancing, Flying, Singing
- 11.1 Kagu Weird Dancing
- 11.2 Screamer Wild Flight Dis-Displays

A Rook "anting" with a lighted match. (New Scientist, 1:10, June 27, 1957.) [BBB12]

11.3 Hummingbird Singing Assemblies [BBB37]

BBB12 Anting (Many birds rub themselves with ants. Purpose(s) debatable. Used besides ants: millipedes, snails, mothballs, burning cigarettes, etc.)

BBB13 "Hangers"; Upside-Down Birds
13.1 Temporary Hangers (e.g.; ravens, birds-of-paradise)
13.2 Regular Hangers (i.e.; upside-down during rest and sleep) (e.g.; some parrots, tits, manakins, mousebirds)

A male Blue Bird-of-Paradise hanging from a branch in an inverted display to a female. Some birds sleep inverted. (J. Barbaris from Nature, 293:257, 1981.) [BBB13]

BBB14 Curious Unexplained Automatisms
14.1 Head Tics (e.g.; guans, chachalacas)
14.2 Rocking (e.g.; Woodcocks) [BBB18]
14.3 Head Bobbing (e.g.; Rock Doves)

BBB15 Handedness ("Footedness") in Birds (e.g.; parrots, crossbills, Rock Doves)

BBB16 Unusual Aerial Transportation Techniques (e.g.; chicks gripped between thighs, water absorbed in feathers)

BBB17 Unusual Forms of Terrestrial Locomotion
17.1 Underwater Walking (e.g.; dippers)
17.2 "Steaming" (i.e.; wings used as rotary paddles (e.g.; steamerducks)
17.3 "Four-Legged" Climbing (e.g. young Hoatzins which employ temporary claws on wings)

BBB18 Unusual Hunting Strategies (It is easy to infer a modicum of bird intelligence from the examples that follow.)
18.1 Use of Fishing Lures (e.g.; Green Herons)
18.2 Use of Wings' Shade to Attract Fish (e.g.; Black Herons)

The Papuan Frogmouth is said to perch with its mouth open. The odor emanating from its mouth reputedly entices flies to enter. (Natural History, 103:4, February 1994.) [BBB18]

18.3 Use of Fire (e.g.; (Black Kites which intentionally spread natural fires with burning sticks to scare up insects.)
18.4 "Grunting" or "Stomping" (i.e.; stamping the ground to lure worms to the surface.) (e.g.; Kiwis, Kagus) [BBB18] (Even humans do this!)
18.5 Use of Ultraviolet-Bright Urine Trails to Locate Prey

(e.g.; Kestrels after mice)
18.6 Use of Sense of Smell (e.g.; Turkey Vultures)
18.7 Sneak Attacks (e.g.; Pelicans Swallow Small, Naive Migratory Teal)

BBB19 Cooperative Hunting
19.1 Game Drives (e.g.; White Pelicans)
19.2 Synchronized Diving (e.g.; Blue-footed Boobies) [BBB37]
19.3 Pack-Hunting (e.g.; Harris's Hawks) (May be unique among the birds.)

BBB20 Prey-Handling Puzzles (e.g.;
20.1 Shrikes Impaling Prey on Thorns and Barbed Wire (More curious than anomalous.)
20.2 Ability of Some Birds to Catch and Hold Many Fish in Their Mouths (e.g.; Puffins)

BBB21 Avian Prey and Food: Some Misconceptions
21.1 Insect Mimicry Not Very Effective
21.2 Predators Often Ignore the "Unfit"
21.3 Ospreys ("Fish Hawks") Also Consume Small Mammals
21.4 Vultures Often Take Live Prey
21.5 Chuck-will's-widows Often Swallow Small Birds in Flight
21.6 Bee-eaters Eschew Drones (Why? And how can they distinguish the drones in flight?)
21.7 Consumption of of Indigestible Substances (i.e..; wax, rubber) (e.g.; honeyguides)
21.8 Avian Vampirism (e.g.; Oxpeckers. Galapagos Mockingbirds)

BBB22 Unusual Sexual Behavior
22.1 Reverse Mounting (e.g.; Black-throated Blue Warblers)
22.2 Prostitution to Reach Food Sources Guarded by Males (e.g.; Purple-throated Caribs)
22.3 Homosexuality (e.g.; gulls, geese, Ostriches)
22.4 Interspecies Mating (e.g.; many ducks)
22.5 Face-to-Face Copulation (e.g.; Stitchbird, unique among the birds?)

BBB23 Avian "Sperm Wars': Cloaca-Pecking (Purpose: ejection of sperm from previous matings) (e.g.; Dunnocks)

BBB24 Unusual Mating Systems (i.e.; polyandry, polygyny, etc.)

BBB25 Two Species with a Common Nest (e.g.; American Robins and Mourning Doves)

BBB26 Female Ability to Determine Clutch Size in Some Species

BBB27 Exotic Objects and Eggs in Nests (e.g.; egg-like stones, stolen eggs of other species) [BBB44]

BBB28 Unusual Methods of Heating and Cooling Eggs
28.1 Use of Feet (e.g.; murres, penguins, boobies, etc.)
28.2 Use of Geothermal Heat, Heat of Rotting Vegetation (e.g.; the megapodes, such as the Brush Turkey of Australia) [BBT27]
28.3 Water-cooling of Eggs
28.4 Young of First Brood Incubate Second Brood (e.g.; White-rumped Swiftlets)

BBB29 Brood Parasitism: How Did It Begin? (It is and has been a seesaw battle of adaptations between parasites and hosts.)

BBB30 Disparities between Parasite-Host Adaptations (i.e.; some birds eject parasite eggs, others tolerate them)

BBB31 Tolerance of Parasite Chicks (Host birds are often able to distinguish parasite eggs but fail miserably to discern parasite chicks. This imbalance is puzzling.)

BBB32 Tolerance of Parasite Eggs Even When They Are Recognized as a Threat
32.1 When Parasite Chick Helps Control Parasites (e.g.; some oropendolas and parasitic Giant Cowbirds)
32.2 When the Brood Parasite Enforces Tolerance (e.g.; Black-billed Magpies by Great Spotted Cuckoos)

BBB33 Murder for Purposes Other Than Food and Brood Reduction
33.1 Parasite Chicks Eject or Kill Host Chicks
33.2 Territorial Defense (e.g.; loons)
33.3 If Nests Are in Short Supply, Adult Birds Will

A nestling Eurasian Cuckoo ejecting an egg of the host species helped by a special hollow in its back. (B. Campbell and E. Lack; A Dictionary of Birds, 1985. [BBB33]

Kill One Another (e.g.; Starlings)
33.4 Blue-feather Shortages (Satin Bowerbirds Prefer blue feathers to adorn their bowers and will kill blue-feathered birds.)

BBB34 Infanticide
34.1 Intentional (i.e.; in brood reduction due to lack of resources)
34.2 Intentional (e.g.; by a new male to restart breeding cycle) (This occurs even among mammals.)

BBB35 Siblicide (i.e.; in instinctive brood reduction)

BBB36 Information Processing in Migratory Behavior (How is migration information passed to young?) [BBB3]

BBB37 Uncommon Groupings of Birds
37.1 Fixed-Size Groups (e.g.; Jungle Babblers)
37.2 Mixed-Species Flocks (i.e.; organized and led by specific species)
37.3 Existence of Avian Information Centers (e.g.; Ravens)
37.4 Immense Aggregations of Migrants (e.g.; Passenger Pigeons a century ago, shorebirds today at Bay of Fundy, Canada)
37.5 The "Dread" Phenomenon (i.e.; sudden unexplained silences in otherwise noisy breeding colonies)
37.6 Synchronized Feeding Groups (e.g.; puffins, gannets) [BBB19]
37.7 Singing Assemblies (e.g.; Little Hermits) [BBB11]
37.8 Cliff-Facing Nesters (e.g.; Kittiwakes)
37.9 Uphill-Facing Singers (e.g.; on very steep Himalayan slopes)

BBB38 Flock Synchrony: Various Theories, No Consensus [BABl, BFBi]

BBB39 Flight Formations
39.1 Echelons and Vs (common explanation of aerodynamic advantages shown to be inadequate) (e.g.; geese, etc.)
39.2 Alighting in Circles (e.g.; Starlings)
39.3 Circular Flight Formations (e.g.; Sooty Shearwaters)
39.4 "Kettles" (i.e.; huge. noisy aerial displays of diving and tumbling birds) (e.g.; Ravens)

BBB40 Avian "Courts" and "Funerals" (Group-applied justice!)
40.1 Apparent "Courts" (e.g.; crows, storks) [BMT8]
40.2 Apparent "Funerals" (e.g.; magpies)

BBB41 Apparent Avian Graveyards (e.g.; Gentoo Penguins)

BBB42 Huddling and Stacking
42.1 Vertical Stacking (e.g.; Harris's Hawks, 2 to 4 per stack)
42.2 Tortues (i.e.; slowly rotating masses of incubating penguins) (e.g.; male Emperor Penguins)
42.3 Pyramiding (i.e.; for heat conservation) (e.g.; Inca Doves)
42.4 Clustering in Bunches

(e.g.; Wood-Swallows)

BBB43 Anecdotes of Great Bird Battles with High Casualties (e.g.; Starlings, Common Ravens)

BBB44 Miscellaneous Curiosities of Avian Behavior

44.1 Inter-Species Preening (e.g.; Brown-headed Cowbirds get preened by species that do not preen their own species!)

44.2 Collection of Strange Objects (e.g.; Wrynecks) [BBB27]

BBBa Claim That Penguins Topple Over When Aircraft Fly Over (This seems to be unsubstantiated.)

BBBb Chickens Addicted to TV

BBBc Nest Protection with Carnivore Fur (e.g.; waxbills) [BBT29]

BBBd Avian Trading (e.g.; magpie leaves coins for bread)

BBBe Extra-Pair Copulations Enhance Immunocompetence (e.g.; Bluethroats)

BBC AVIAN CHEMICAL PHENOMENA

BBC1 Palatable Eggs Are More Vulnerable to Predation (Evolution theory predicts the opposite.)

BBC2 Conspicuous Plumage Advertises Unpalatability (Conventional evolutionary wisdom holds it arose because of sexual selection---like the peacock's tail.)

BBC3 Stinking Birds (Why do some birds decay extremely rapidly and produce very foul odors? (e.g.; megapodes, some cuckoos)[BMC3]

BBC4 Poisonous Birds and Poisonous Frogs: Convergent Evolution? (The chemically complex poisons are identical in birds and frogs.) (e.g.; pitohouis, South American poison frogs)

BBC5 Ratites (the Ostrich, etc.) Are More Primitive than Flying Birds (This according to protein analysis. However, scientific consensus has the ratites descending from flighted birds.)

BBC6 Australian Songbirds Evolved Earlier than European Songbirds (A conclusion from protein analysis that is contrary to popular scientific thought.)

BBC7 Some Molecular Analyses Suggest that Birds Are More Closely Related to Mammals than Reptiles.

BBC8 The Inability of Some Some Taxonomically Scattered Birds to Synthesize Ascorbic Acid (Vitamin C) [BHC10, BMC4]

BBCa Claim that Birds Can Transmute Elements by Bodily Processes (This from Kervran's controversial experiments. (e.g.; chickens transmuted Si in food to Ca.)

BBD DISTRIBUTION OF BIRDS IN TIME AND SPACE

BBD1 Geographically Discontinuous Bird Populations (Often these populations are separated by oceans.) (e.g.; the ratites, finfoots, megapodes, and others)

BBD2 Uncolonized Areas; Unfilled Niches

2.1 Absence of Woodpeckers (e.g.; Australia, New Zealand, Ireland)

2.2 Vultures (e.g.; Sri Lanka, despite proximity of India)

2.3 Ospreys (This species is cosmopolitan except that they appear never to breed in South America!)

BBD3 Land Birds Observed Far at Sea (Many species have been observed hundreds of miles from land.)

BBD4 Late Survival of Birds Recently Abundant

4.1 Passenger Pigeons (Good sighting claimed in 1930.)

4.2 Moas (Sighting in 1873.)

BBD5 Distribution Curiosities

5.1 Extraordinary Concentrations (e.g.; crows, queleas, auklets)

5.2 Mass Deaths (e.g.; Lapland Longspurs, Eared Grebes, alcid "wrecks" in Pacific)

BBDa Frequent Mass Disappearances of Homing Pigeons during Races

BBE THE AVIAN FOSSIL RECORD

BBE1 Current Paradigms Associated with the Fossil Record of Birds (Baseline targets.)

BBE2 Evidence against a Dinosaurian Origin of Birds (Avian lungs, hands, and feet are radically different.)

BBE3 Protoavis: A Pre-Archaeopteryx Bird?

BBE4 Unresolved Nature and Phylogeny of Archaeopteryx

BBE5 The Enigma of Feather Evolution (Was flight the initial goal?) [BBA9]

BBE6 Fossils of Ostrich Ancestors Found in Northern Hemisphere (Ratites long considered restricted to the Southern continents.)

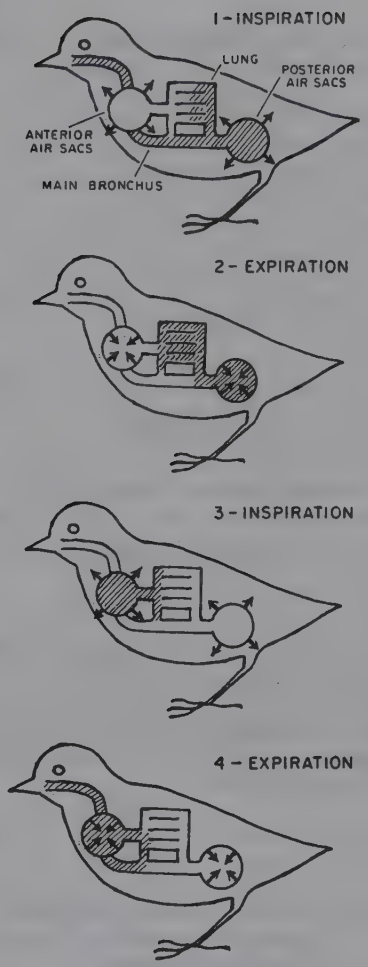
BBE7 Controversial Feathers of the London Archaeopteryx Fossil

BBE8 Errant Giant Fossil Eggs (e.g.; Elephant Bird Eggs in Madagascar and Australia)

BBEa Dinosaur Bone Structure Is Like that of Birds (This is not controversial today!)

BBEb Fossils of So-Called "Feathered Dinosaurs" Found in China (e.g.; Protoarchaeopteryx, Caudipteryx, Longisquamma) [BBEb]

BBEc Discovery of Fossils of "Modern" Birds in the Cretaceous (i.e.; prior to the Cretaceous-Tertiary extinction event) (Modern birds were thought to have evolved after the assumed asteroid collision.)



The unique two-cycle avian respiratory system, Air flows unidirectionally. (F.B. Gill; Ornithology, 1990.) [BBF1]

BBF AVIAN BODILY FUNCTIONS

BBF1 The Avian Respiratory System: Unique, Complex, Sophisticated (The series of revolutionary physiological changes required has not yet been hinted at in the fossil record.)

BBF2 Avian Bodily Functions: Some Oddities

2.1 Nocturnal Torpor (e.g.; many hummingbirds)

2.2 Seasonal Torpor (e.g.; poorwills)

2.3 Shedding of Stomach Linings (e.g.; hornbills)

2.4 Production of Crop "Milk" (e.g.; pigeons and doves)

2.5 Fermentation Chambers (Necessary in leaf-eaters.) (e.g.; Hoatzins)

2.6 Occasional Parthenogenesis (e.g.; domestic turkeys and chickens)

2.7 Odd Breeding Cycles (e.g.; Sooty Terns, every 9.6 months)

2.8 Higher Fertilization Rates in Extra-Pair Matings (e.g.; Zebra Finches)

NONPASSERINES

GREAT BLACK-BACKED GULL

COMMON EIDER

PASSERINE

YELLOW-RUMPED WARBLER

The sperm of nonpasserine species are straight and propel themselves with lashing tails. The sperm of the Passerines (perching birds) are helical and corkscrew forward. (F.B. Gill; Ornithology, 1990.) [BBF2]

2.9 Passerine ("Perching Birds") and Nonpasserine Sperm Differ Markedly
2.10 Embryo Activity Correlated with the Sun (e.g.; domestic chickens)
2.11 Claim that Chickens Grow Faster in Electric Fields

BBFa Females Have the Ability to Eject the Sperm of Subdominant Males

BBFb Unknown Purpose of the Unique Foam Gland in Old World Quail

BBFc Mass Falls of Dead Birds (e.g.; starlings) [GWF13]

BBFd Avian Half-Brain Sleep (Similar to that in some mammals) [BMF23]

BBG AVIAN GENETICS

BBG1 Species in Which the mtDNA Is Much More Diverse than Their Morphology Suggests (e.g.; Three-Toed Woodpeckers)

BBG2 Discordance in the Date of Divergence of Modern Birds (The fossil record and molecular clocks disagree.) [BBEc]

BBG3 Discordances between Phylogenies Established from Morphology and DNA Analysis (e.g.; starlings closer to mockingbirds than blackbirds)

BBG4 Dearth of Introns or "Nonsense DNA" in Birds (Introns are common in other vertebrates but absent in arthropods.) [BAGa]

BBGa Observation that Dinosaur DNA Resembles that of Birds

BBI INTERNAL STRUCTURES AND SYSTEMS

BBI1 Potential Avian Magnetoreceptors
1.1 Magnetite Particles; (e.g.; found in pigeons)
1.2 Bird Eye-Pigments as Photoreceptors

BBI2 Curious Internal Structures
2.1 Many Air Bubbles under the Skin (e.g.; screamers)
2.2 Existence of Lymph "Hearts" (Found in all bird embryos but only a few adults.)
2.3 Apparent Reappearance of Characters of "Primitive" Birds in Modern Birds (e.g.; the leg muscles of Common Mynahs)
2.4 A Unique Female Vocal Organ (e.g.; buttonquail)
2.5 Birds with Translucent Flesh (e.g.; the tinamous)

BBIa Birds with Exceedingly Long, Coiled Tracheas (The need for these bizarre structures is uncertain.) (e.g.; Trumpeter Swans)

BBO AVIAN ORGANS

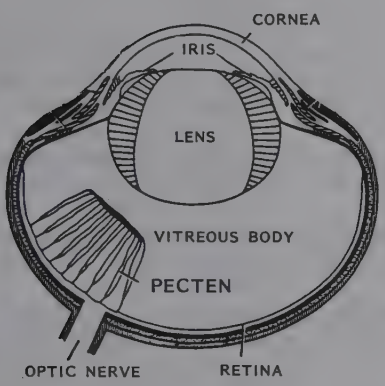
BBO1 Complexity and Sophistication of Some Owl Ear-Brain, Sound-Localization Systems

BBO2 Regeneration of Brain Neurons (Unexpected in vertebrates.)

BBO3 Curiosities of Avian Brains
3.1 Strange Position of Woodcock Brain (It is almost

upside down.)
3.2 Correlation of Rate of Evolution with Brain Size
3.3 Nonlateralization of Vocal Control in Parrots (Curiously, song birds are lateralized vocally, but parrots, which can imitate the human voice but cannot sing, are not.)
3.4 The Hyperstriatum: A Unique Feature of the Avian Brain (i.e.; associated with bird intelligence but absent in mammalian brains)

BBO4 The Pecten: A Unique Structure of Uncertain Purpose in the Avian Eye



Cross section of the avian eye showing the location and general shape of the unique pecten. (A.L. Thomson; A New Dictionary of Birds, 1964.) [BBO4]

BBO5 Curiosities of Avian Eyes
5.1 Owl Eyes Are Tubular and Cannot Rotate
5.2 Birds with Vertical Pupils (e.g.; skimmers only) (This may be to reduce glare from water surfaces.) [BMOh]
5.3 Bird Eyes with Two Foveae (e.g.; hawks, swallows, hummingbirds, etc.)

BBO6 High Complexity and Sophistication of the Avian Eye [BHO1]

BBO7 Remarkable Tongue Adaptations (e.g.; muscle of some woodpecker tongues are anchored near a nostril and coil back around the eye)

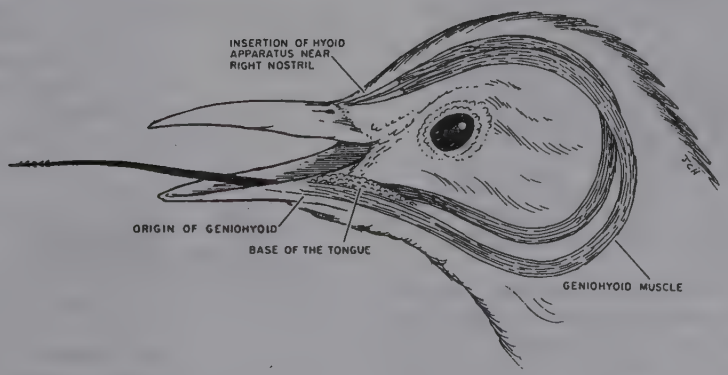
BBO8 The Loss and Reduction of Reproductive Organs (e.g.; most males lack a penis; most females lack a right ovary and oviduct) [BMI4]

BBOa Barn Owl's Auditory Neurons Multiply Signals Instead of Adding Them---the Usual Situation in other Birds

BBOb Migratory Birds Absorb Parts of Internal Organs to Reduce Weight

BBOc Birds with False Penises (The purpose is unknown.(e.g.; weaver birds)

BBOd The Vocal Organ of Singing Birds, the Syrinx, Is Two-Barreled (Birds can thereby produce two tones that are not harmonically related.) [BBO25]



In several woodpeckers, the tongue muscle passes back around an eye and is anchored near the right nostril. (N.A. Proctor and P.J. Lynch; Manual of Ornithology, 1993.) [BBO7]

BBT UNUSUAL TALENTS AND FACULTIES

BBT1 Infrasound and Atmospheric-Pressure-Change Detection Capabilities (Present in many species. Infrasound may be used in navigation.) [BBT10]

BBT2 Presence and Utility of Ultraviolet Vision in Many Birds (Birds thus see a different world than humans.)

BBT3 Echolocation: Parallel Evolution in Birds (e.g.; Oilbirds, some swiftlets) (Some mammals also echolocate.)

BBT4 Navigational Feats during Migration (e.g.; young, naive birds migrating long distances without adults) [BBB36, BBT8, BMT2]]

BBT5 Homing: Release Experiments (e.g.; homing pigeons, White-crowned Sparrows, and others) [BMT2]

BBT6 Curious Migration Phenomena: Navigation Errors?
- 6.1 Loop Migration (e.g.; Connecticut Warblers)
- 6.2 Reverse Migration (e.g.; many observations of mixed species flying in the wrong direction)
- 6.3 Mirror-Image Migration (i.e.; flying southwest instead of southeast in North America) (e.g.; a few cases every year, various species) (Error source not known.)

BBT7 Complexity and Sophistication of Avian Navigation (i.e.; an enormous amount of information and computation required using stars, sun, odors, infrasound, geomagnetic field)

BBT8 Inheritance of Migration Data (i.e.; how is this information transmitted genetically?) [BBB36]

BBT9 The Existence of Avian Migration (i.e.; how and why did it originate?)

BBT10 Apparent Sensitivity to Impending Weather Changes and Earthquakes (e.g.; many anecdotes on file) [BBT1, BMT4, BRTj]

BBT11 Possible Unrecognized Senses
- 11.1 Ability to Assess the Internal Condition of Trees (i.e.; the presence of dead hearts) (e.g.; Red-cockaded Woodpeckers)
- 11.2 Location of a Displaced Person (Anecdote where bird owner--a young boy---was removed to a hospital) (e.g.; homing pigeon)
- 11.3 Location of Food Caches under Deep Snow (e.g.; Spotted Nutcrackers)

BBT12 Remarkable Feats of Flight
- 12.1 Long Distances with Rare Stops (e.g.; Wandering Albatrosses, as far as 15,000 kilometers) [BRTa]
- 12.2 Long Distances Nonstop (Record: 2,500 miles for White-Rumped Sandpiper)
- 12.3 High-Altitude Flight (e.g.; Bar-headed Geese, at 25,000 feet)
- 12.4 High-Speed, Long-Distance Flights (e.g.; Red Knots, 1,800 kilometers in 2 days)

BBT13 The Controverted Origin of Avian Flight [BATj, BMA41, BREg]

BBT14 Unanswered Questions Concerning Flightlessness
- 14.1 Did All Flightless Birds Evolve from Flighted Ancestors?
- 14.2 Are All Flightless Birds "Primitive"?
- 14.3 Why Is Flightlessness Sometimes Favored by Natural Selection?
- 14.4 Why Do Some Likely Species Retain Their Flying Ability? (i.e.; those on predatorless islands)
- 14.5 Is Flightlessness Neotenous?
- 14.6 How and Why Has Flightlessness Developed So Rapidly?
- 14.7 Is Flightlessness Reversible?

BBT15 Some Curiosities of Avian Flight
- 15.1 Spending Whole Nights Aloft (e.g.; swifts)
- 15.2 Sleeping in Flight (e.g.; albatrosses)
- 15.3 Copulating in Flight (e.g.; swifts)
- 15.4 Flying Upside-down (e.g.; ravens)
- 15.5 Flying Backwards (e.g.;

hummingbirds, Hooded Warblers)
15.6 Exceedingly Clumsy Fliers (e.g.; tinamous)

BBT16 Deep-Diving Capabilities (e.g.; Emperor Penguin, 500 meters)

BBT17 Vocal Mimicry in Birds
17.1 Of Humans (e.g.; mynahs, parrots, etc.) [BMT10]
17.2 Of Other Birds (e.g.; Marsh Warblers) [BBT19]
17.3 Of Inanimate Objects (i.e.; machinery) (e.g.; Superb Lyrebirds)

BBT18 Birds That Vocally Mimic Only in Captivity (e.g.; mynahs and parrots)

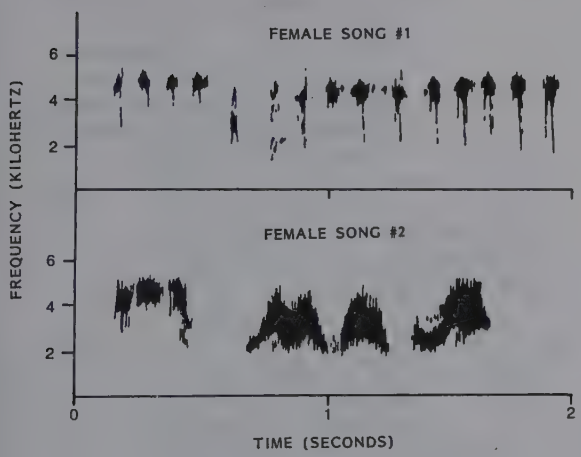
BBT19 Vocal Mimicry of Hosts by Parasitic Species (e.g.; some cuckoos, honeyguides, whydahs, indigobirds)

BBT20 Duetting (e.g.; Eastern Whipbirds, Bobwhites, etc.) [BMT8]

BBT21 Chorusing (e.g.; Australian Magpies, European Linnets) [BSBj]

BBT22 Large Vocal-Repertoire Sizes and High Speeds of Delivery [BMT8]
22.1 Large Repertoires (e.g.; Brown Thrasher, 2,000+)
22.2 Rapid Delivery (e.g.; Wood Larks, 68 notes/sec)

BBT23 Female Singers (e.g.; many species)



The female Red-Winged Blackbird sings two songs, compared to the male's one. (C.K. Catchpole and P.J.B. Slater; Bird Song, 1995.) [BBT23]

BBT24 Whisper Songs and Subsongs (These are soft, diverse, and different from a species' characteristics songs.)

BBT25 The Two-Voice Phenomenon (The ability of many birds to sing two nonharmonically related notes simultaneously)

BBT26 Some Curiosities of Avian Vocalizations
26.1 Swan Songs (i.e.; anecdotal, before death)
26.2 Apparent Ventriloquism (e.g.; Wilson's Plover)
26.3 Infrasound Vocalization (e.g.; Western Capercaille)
26.4 Exceedingly Long Vocalizations (Apparently without taking breaths) (e.g.; Eurasian Nightjar)

BBT27 Construction of Incubator Nests (These involve the use of the sun, geothermal heat, and/or heat from rotting vegetation)

BBT28 Elaborate Woven and Sewn Nests (e.g.; Village Weavers and tailorbirds) [BMT12]

Village Weavers construct sturdy nests employing several types of knots. (Science Digest, 91:72, August 1983.) [BBT28]

BBT29 Nests Containing Protective Materials
- 29.1 Parasite-Repelling Plants (e.g.; Common Starlings) [BMTc]
- 29.2 Sticky and Slippery Barriers (e.g.; Red-cockaded Woodpeckers)
- 29.3 Snake Skins (e.g.; Great Crested Flycatchers)
- 29.4 Predator Fur (e.g.; waxbills [BBBc]

BBT30 Bowers (see BBB5)

BBT31 Nest Curiosities
- 31.1 Roosting Nests (i.e.; virtually all birds use their nests solely for incubation) (e.g.; exceptions, Bananaquits, Verdins)
- 31.2 Fortified Nests (Females are imprisoned by an artificial wall.) (e.g.; hornbills)
- 31.3 Nest Ramparts for Wind Protection (e.g.; Bar-tailed Larks)

BBT32 Tool Use [BMT11]
- 32.1 Use of Twigs and Thorns to Reach Prey (e.g.; many species)
- 32.2 Use of Dropped Rocks as Weapons to Defend Nest (e.g.; Common Ravens)
- 32.3 Use of Stones to Break Eggs (e.g.; Egyptian Vultures, Black-Headed Vultures, Bristle-Thighed Curlews)
- 32.4 Use of Bark Wedges (e.g.; Brown-headed Nuthatches)
- 32.5 Use of Shells as Hammers (e.g.; White-winged Choughs)
- 32.6 Use of Automobiles as Nutcrackers (e.g.; American and Carrion Crows)

BBT33 Communication between Chick Embryos (i.e.; vocal clicks and vibrations synchronize hatching)

BBTa Songs of Darwin's Finches Change as Beaks Adapt to Environmental Conditions

BBTb Buried Food Detected by Back-Pressures (e.g.; Red Knots which employ Herbst corpuscles)

BBTc "Wing-Singing" (i.e.; rapid snapping of wings combined with vocalizations) (e.g.; some manakins)

BBTd Vocal Beat Phenomenon (i.e.; use of two-voice capability to generate a unique beat frequency to locate chicks in large colonies) (e.g.; Emperor Penguins)

BBX AVIAN INTERFACE PHENOMENA

BBX1 Serious Attacks on Humans by Birds (e.g.; the Ostrich, cassowaries)

BBX2 Unusual Predators of Birds (e.g.; frogs, fish, praying mantis, snapping turtles) [BSBi]

BBX3 Unusual Bird-Animal Psychological Interfaces (e.g.; hypnosis or fascination by humans, snakes, weasels) [BBX4, BHX2, BMX7, BRXa]

BBX4 Curious Associations of Birds with Other Animals and Plants
- 4.1 Humans (e.g.; honeyguides) [BBB1]
- 4.2 Other Mammals (e.g.; honeyguides and ratels, Black Petrels and dolphins)
- 4.3 Reptiles (e.g.; Crocodile-bird)
- 4.4 Insects (e.g.; caciques and wasps) (Wasps protect nests of caciques from monkeys but seemingly get nothing in return.)
- 4.5 Plants (e.g.; Dodos and the Calvaria tree) (Tree's seeds would not germinate unless abraded by Dodo's muscular gizzard.)

BF FISH[25]

BFA EXTERNAL APPEARANCE AND MORPHOLOGY
BFB UNUSUAL PISCINE BEHAVIOR
BFC FISH BIOCHEMISTRY
BFD DISTRIBUTION OF FISH IN TIME AND SPACE
BFE THE FOSSIL RECORD OF FISH
BFF PISCINE BODILY FUNCTIONS
BFG FISH GENETICS
BFI INTERNAL STRUCTURES OF FISH
BFO FISH ORGANS
BFT FISH TALENTS AND CAPABILITIES
BFX UNUSUAL INTERFACES BETWEEN FISH AND OTHER SPECIES

Although usually hidden from sight, except in aquaria and goldfish ponds, the 28,000+ species of fishes rival the birds and insects in their physical beauty and physiological anomalies and curiosities. A few of the more interesting---sometimes profound--- piscine features and capabilities are listed below:

- The ability of many species to rapidly change gender;
- The air-breathing of lungfish in their burrows when the water dries up;
- The synthesis of powerful poisons by the stonefish and many others;
- The creation and active display of fish-like lures by anglerfish;
- The evolution of electrical receptors and generators for communication, navigation, and hunting;
- The use of light for communication, fighting, and hunting. The light sources may be self-generated or produced by symbiotic bacteria;
- Radical metamorphoses---as remarkable as in the arthropods---by flounders, eels, salmon, and others;
- Long-range migrations requiring acute navigation capabilities, as seen in salmon, eels, shad, and others.

BFA EXTERNAL APPEARANCE AND MORPHOLOGY

BFAa Extreme Body Asymmetry (e.g.; the flatfish, the most asymmetric of the vertebrates) (Right-left asymmetry is hard-to-explain in bilateral vertebrates.)

BFAb Morphs (Fish that exist in forms that differ from the normal males and females of a particular species.)

b.1 Salmon "Jacks" or "She-Males" (i.e.; resembling females, they sneak in to fertilize eggs)

b.2 Salmon "Paar" (Premigratory juvenile fish, now becoming sexually mature early)

b.3 Limnetic and Benthic Forms (Fresh and salt water varieties of the same species may vary greatly in size) (e.g.; sticklebacks)

b.4 Supermales (Larger than ordinary males and often with different colors) (e.g.; bluehead wrasse, types I and II of midshipmanfish)

b.5 Some Salmon Bypass Parr/Smolt Stages

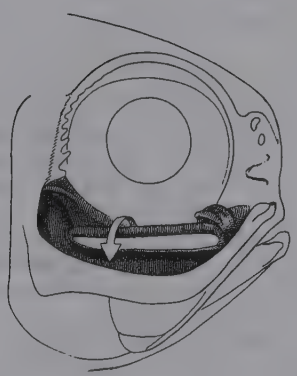
BFAc Fish Colors and Patterns

c.1 Existence of an Incredible Number of Different Colors and Patterns (Why so many beautiful forms?) (Why are

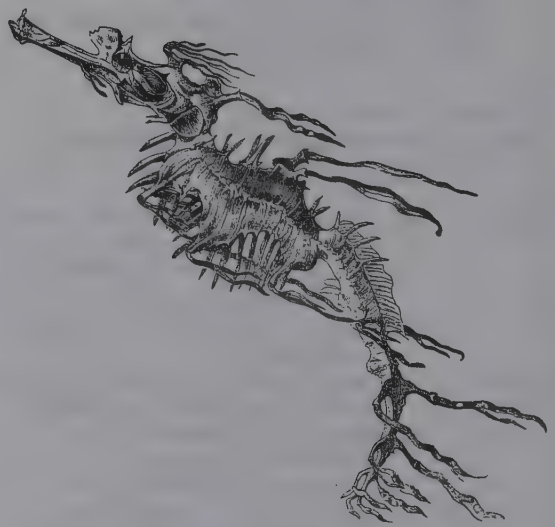
so many abyssal fishes so beautiful when there is no light to see them? [c.2]
c.2 Successful Existence of Many Drab, Ugly Fish [BFAc.1]
c.3 Patterns That Change During Time (e.g.; angelfish)
c.4 Poorly Explained Mechanism for Generation of Complex Patterns and Colors (e.g.; many tropical-reef fish) [BBA10]
c.5 Remarkable Colors of Wings of Flying Fish (Strangely, these can be seen only during flight. Can they have an evolutionary purpose if apparent only then?)
c.6 Presence of Mirror-Like Crystals on Skin [See BFBm]
c.7 Fish That Suntan (e.g.; hammerhead sharks---uniquely?)
c.8 Transparent Fish (i.e. inner organs visible) (e.g.; Ambassis ranga)

BFAd Luminous Fish
d.1 Self-Luminous Fish (Luminosity may be whole-body, just on various body parts, on lures, etc.) (e.g.; cookie-cutter shark and many others)
d.2 Fish Employing Luminous Bacteria (e.g.; flashlight fishes)
d.3 Apparently Only Saltwater Fish Are Self-Luminous
d.4 Fish Produces a Red Searchlight Beam Invisible to Prey (The light is projected by a mirror-like surface) (e.g.; dragonfish Pachystomias)
d.5 Fish with Internal Luminosity (e.g.; luminous ring around stomach opening, Equila splendens)

BFAe Remarkable Mimicry in Fish
e.1 Mimicry of Other Species in Form of Small Lures Attached to Stalks or Other Body Parts (e.g.; anglerfish)
e.2 Mimicry of Other Species to Confuse Predators (e.g.; trumpetfish)
e.3 Mimicry of Other Species during Predation (e.g.; scale-eating fish mimics cleanerfish and can get close to prey)
e.4 Mimicry of Plants (e.g.; sargassum fish, leafy sea-dragon, leaf-fish)
e.5 Mimicry of the Physical Environment for Concealment (e.g.; flounders, anglerfish, and others) (Flounders in the lab match geometrical patterns beneath them which they cannot see directly.)
e.6 Mimicry of Same Species (e.g.; she-males for sneak

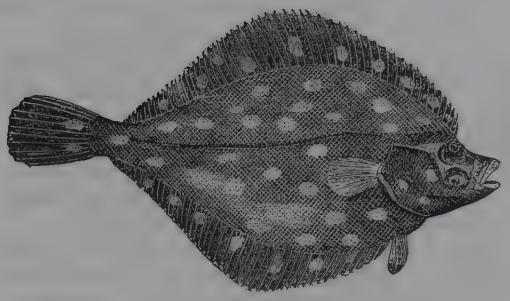


In this species of flashlight fish, the light organ, lit by bacteria, rolls down into an obscuring pouch when not in use. (Scientific American, 236:112, March 1977.) [BFAd]



The leafy sea-dragon camouflages itself among seaweed. (Animal Life, 54:130, 1950.) [BFAe]

These striped fish (Aeoliscus) stand on their heads among protecting sea-urchin spines. A curious form of mimicry? (Quarterly Review of Biology, 30:29, 1955.) [BFAe]



When first born, flounders swim upright but soon metamorphose into flatfish. Their eyes migrate as shown. Many flatfish can mimic the background. (Nature, 76:79, 1907.) [BFAe, BFAh]

mating opportunities) [BFAb, BRAd]]

e.7 Mimicry of Host Fish (e.g.; remoras change color to match shark host)

BFAf Rapid Size Adaptations to New Environments (e.g.; some guppies, mosquitofish)

BFAg Sex-Changing Fish [BAAg, BFAh]

g.1 Female-to-Male (e.g.; many coral-reef fish)

g.2 Male-to-Female (e.g.; Chinook salmon)

g.3 Back-and-Forth as Social Situations Change (e.g.; some gobies)

BFAh Large-Scale Metamorphosis [BFAg]

h.1 Flatfish Transformation (i.e.; skull and eyes transform in just 3 days)

h.2 Reverse Flatfish Transformation (Rarely, the eyes are on the left side. As with left-handed humans, there are likely other differences.)

h.3 Common Eels (Change from: (1) larval, salt-water form---leptocephalus to; (2) "glass" eels---adult morphology--- to; (3) darker fresh-water "elvers" to---years later---; (4) final, migratory "silver" form. Note the resemblance to salmon migrations that take place in opposite directions but also involve morphological changes. One has to ask

Some breeding salmon returning from the sea undergo a curious metamorphosis, acquiring humped backs and grotesquely distorted jaws. [BFAh]

the "whys" and "hows" of these remarkable body transformations.)

h.4 Strange "Acronurus" Larval Stage in Some Fish (e.g.; surgeonfishes)

BFAi Unusual Degenerate Fish

i.1 Blind, Sometimes Eyeless, Colorless Cavefish

i.2 Tiny Males Permanently Fused to Females (These males lose most of their body functions.) (e.g.; some anglerfish)

BFAj Unisex Fish Species (i.e.; females only, which mate with males of closely related species. The males' sperm stimulate but do not usually fertilize the eggs, which

develop into females. However, sometimes male genetic material is injected into the eggs.) (e.g.; Amazon molly and many others)

BFAk Rapid Speciation in Freshwater Lakes (e.g.; cichlids in African lakes. But in some similar, likely lakes this phenomenon is not observed.)

BFAl Remarkable Morphological Convergences (e.g.; seahorse and chameleon, both have prehensile tails and rolling, independent eyes)

BFAm Sex of Young Depends upon Temperature (e.g.; silversides)

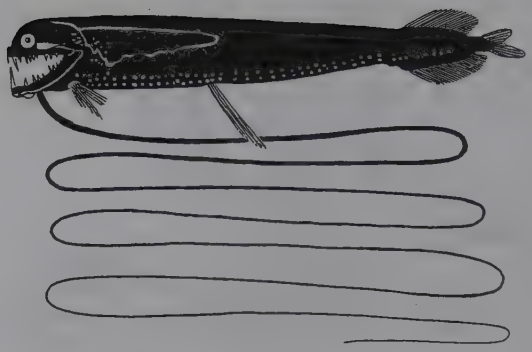
BFAn Presence of Sucking Discs to Hold onto Rocks (e.g.; Homalopteridae, "hillside fishes," clingfishes)

BFAo Presence of Male "Gonopodium" (Here, an anal fin modified into a phallus-like structure; female genitals are likewise one-sided.) (e.g.; Anableps and others) (Right-sided males must copulate with left-sided females)

BFAp Presence of Twisted Needle-Like Jaws That Cannot Close (e.g.; snipe eels)

BFAq "Living Fossils" (i.e.; living fish that have changed but little over hundreds of millions of years) (e.g.; coelacanths)

BFAr Fish with Bizarre Morphologies
- r.1 Extended Eye and Sensory Platforms (e.g.; hammerhead sharks)
- r.2 Tailless Fishes (e.g.; mola or ocean sunfish)
- r.3 Bony Tubercules Replace Scales (e.g.; lumpfish)
- r.4 Fin Slots (i.e.; for retractable fins to reduce drag) (e.g.; bluefin tuna)
- r.5 Barbels Many Times the Fish's Length (The uses of these barbels, if any, are unknown.) (e.g.; the melanostominatids)
- r.6 Fish with Spiky, Paw-Like Appendages (e.g.; ornate ghostpipefish)
- r.7 Sea Serpent Stand-Ins (e.g.; oarfish)
- r.8 Swimming Stomachs that Can Engulf Prey as Large as the Predator (e.g.; gulper eels)
- r.9 Mouthless Fishes (e.g.; deformed carp and suckers, which somehow obtained food, probably through their gill openings)
- r.10 Fish with Greatly Extendable Mouths (e.g.; some wrasses)



This deep-sea fish (Grammatostomias) trails a barbel ten times its body length. Purpose unknown. (Sea Frontiers, 6:137, 1960.) [BFAr]

BFAs Embryo Teeth Shed In Womb (e.g.; great white shark)

BFAt Fish with Circular Plugs of Flesh Removed (These are victims of cookie-cutter sharks.)

BFAu Fish and Foreign Objects (While a great variety of objects can be found inside fish, several fish have been caught tightly constricted by rubber bands!)

BFAv Terata (These are mainly birth defects.)
- v.1 Double Fish Joined at Stomachs (e.g.; catfish)
- v.2 Two-Headed Fish (e.g.; sharks)

BFAx Claims of Fish Marked with Letters or Entire Written Words (e.g.; Arabic for Allah)

BFAx Fish with Fins Suitable for Gliding (The so-called "flying fish" arose twice in two genera: Dactylopterus and Exocoetus)

BFAy Fish Cocoons (i.e.; mucous "nightgowns" constructed

daily for protection while sleeping) (e.g.; some parrotfish)

BFAz Anecdotes of Giant Fish (e.g.; many tales on record, particularly those of giant eels, and their larvae)

BFB UNUSUAL PISCINE BEHAVIOR

BFBa Body Inflation for Defense (This involves an expandable stomach, a pumping mechanism, and structural modifications) (e.g.; two families of pufferfish)

BFBb Upside-Down Fishes
- b.1 Temporary Swiming and Resting (e.g.; many fish sheltering in dark caves do so upside down)
- b.2 Permanent Orientation (e.g.; African catfish, in which usual fish counter-shading is also inverted)

BFBc Headstanding
- c.1 Assuming a Head-Down Position for No Apparent Purpose) (e.g.; coelacanths)
- c.2 To Blend in with Sea-Grass Environment (e.g.; some pipefish)

BFBd Walking Fish (They use their fins as legs.)
- d.1 Temporary Land Walkers (They can and do swim when appropriate.) (e.g.; mudskippers---using pectoral fins only---, skates, an electric ray with callused fins)
- d.2 Obligate Underwater Walker (i.e.; it cannot swim) (e.g.; the maltha, which crawls using both pectoral and ventral fins)

BFBe Fish That also Climb Rocks and Trees (e.g.; climbing perch of Asia, climbing catfish of Asia, the darter Characidium)

BFBf Leapfrogging Fish (i.e.; they often jump over turtles, boats, etc.) (e.g.; salt-water gars, such as needlefish and half-beaks, which can be hazardous to boaters)

BFBg Fish That Often Swim Backwards (e.g.; most electric fish, including elephant fish and knifefish)

BFBh Rapidly Spinning Fish (i.e. up to 14 revolutions/second) (e.g.; fresh-water eels when feeding)

BFBi Remarkable Fish Congregations
- i.1 Moon-Initiated Spawning Aggregations (e.g.; Nassau groupers, parrotfish, and many other species)
- i.2 Fish Schools with Highly Coordinated Mass Motion (Schools may be "homotypic," all of one species; or "hypertypic," consisting of several species.)
- i.3 Mass Fish "Suicides" (Like the mass strandings of whales.) (e.g.; 1984, Santa Cruz, about 2,000 tons of anchovies)
- i.4 Scalloped Hammerhead-Shark Clusters (They are mostly female and nonaggressive as they circle around seamounts during the daylight hours. They leave to forage at night.)
- i.5 Eel Balls (Usually, there are about 30 to a clump.) (e.g.; freshwater eels. Curiously snake balls have also been observed.) [BRBd]
- i.6 Enormous Lines of Seasnakes on Ocean Surface (The record aggregation was 3 meters wide and 95 kilometers long.)

BFBj Migration of American and European Eels (Asian eels presumably behave similarly.)
- j.1 Exodus of Lakes and Rivers Triggered by Moon
- j.2 Sargasso Sea is Assumed Destination for Both Populations. (Based on capture of small larvae in area. See next entry.)
- j.3 No Mature (Silver) Eels Ever Caught in Atlantic (Not even in Sargasso Sea!)
- j.4 Some European Eels Migrate into the Mediterranean; Japanese Eels Probably End Up Somewhere near the Marianas

BFBk Unusual Hunting Techniques
- k.1 Use of Lures (Lures of the angler fish actually resemble small fish.) [BFAe]

A hungry angler fish dangling a fish-shaped lure. (Science, 201:369, 1978.) [BFBk]

k.2 Use of Projectiles (Drops of water are spit at insects.) (e.g.; archer fish)
k.3 Playing Dead Encouraging Inspection by Prey (e.g.; a Lake Malawi cichlid)
k.4 Bow-Wave-Riding (A boat scares flying fish into flight, tuna riding on the bow wave pick them off.)
k.5 Use of Mimicry to Escape Observation by Prey (e.g.; leaf fish)

BFBl Females That Prefer to Mate with Other Species (e.g.; Pecos pupfish with sheepshead minnow)

BFBm Light-Fights (These involve the use of male's mirror-like flanks to stun---even kill--- other males with intense reflections of the sun.) (e.g.; Amazon angelfish)

BFBn Fish Learning Abilities
n.1 Annual Cycle in Learning Ability (e.g.; goldfish in laboratory tests)
n.2 Brain Material from Trained Rats Injected into Goldfish Transfers Training to Fish
n.3 Anecdotes about Fish That Learn Anglers' Presence and Methods and Thereafter Become Harder to Catch
n.4 Gobies Stranded in Tidal Pools Learn to Jump from Pool-to-Pool to Return to Sea Even though They Cannot See the Next Pool (Memory and intelligence implied.)

BFBo Prodigious Production of Slime by Captured Hagfish (Just one in a bucket of water transforms whole bucket into jelly!)

BFBp Handedness in Fish (e.g.; scale-eating cichlids attack mainly from one side) (Handedness implies division of labor in the brain, a situation thought to exist only in "higher" animals!

BFBq Curious Carnivory
q.1 Fish That Preferentially Eat Their Own Eggs (e.g.; 3-spined sticklebacks)
q.2 Young Fish That Consume Each Other Both In and Out of Womb (e.g.; tiger sharks) [BSBl]

BFBr Sun-Bathing, Also Called "Shining" (e.g.; tunas, swordfish, the ocean sunfish or mola) [BFAc]

BFBs Claims of Piscine Altruism
s.1 Protection of the Young of Other Species (e.g.; African catfish)
s.2 Piranhas Line Up to Take Turns in Their Mass Attacks on Large Prey
s.3 Unrelated Males Guard Eggs While Females Feed (A possible and curious example of altruism?) (e.g.; Harpagifer bispinis)

BFBt Fish Activity Stimulated by Environmental Phenomena
t.1 Approaching Weather (e.g.; European "weather fish")
t.2 Impending Earthquakes (e.g.; many species) [BFTg]
t.3 Anecdote Involving Fish Activity Engendered by an Aurora (species unknown)

BFBu Kissing Fish (Kisses may last 25 minutes. Purpose undetermined.) (e.g.; kissing gourami)

BFBv Fish That get Seasick (Various species of captured fish being transported in containers on rough seas)

BFBw Fish That Can Knot and Unknot Themselves (e.g.; hagfish, gulper eels)

BFBx Claims of Regular Cycles of Activity (i.e.; usually in

about 6¼-hour periods) (e.g.; many species)

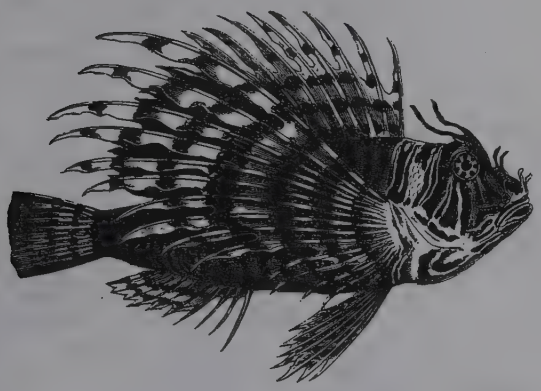
BFBy Females Let Males Eat First (e.g.; some sharks)

BFBz Lunar Influence on Productivity of Fisheries (e.g.; herring)

BFC FISH BIOCHEMISTRY

BFCa Poisonous Fish

a.1 Teleost (Bony) Fish (Many teleost fish support highly venomous spines. Widespread convergent evolution) (e.g.; stonefish, lionfish)



Lionfish sport sharp, poisonous spines, as does the stonefish and several scorpionfish. (J.R. Paxton and W.N. Eschmeyer, eds.; Encyclopedia of Fishes, p. 180, 1994.) [BFCa]

a.2 Cartilaginous Fish (Many rays have mildly poisonous spines. Only one shark seems to be so endowed. (e.g.; the spiny dogfish)

a.3 Tropical Reef Fish. (Depending upon their diets, these fish may poison humans who eat them.)

BFCb Fishes Lacking Hemoglobin. Other ways to transport oxygen to tissues required.

b.1 Permanent Loss (e.g.; icefish) [BFCd]

b.2 Temporary Loss (e.g.; larval eels, which develop hemoglobin eventually)

BFCc Presence of Unique Blood Pigment to Carry Oxygen (e.g.; lamprey eel)

BFCd Some Polar Fish Carry Anti-Freeze Glycoproteins (AFGPs) and Other Chemicals to Keep from Freezing [BRFc]

BFCe Arctic and Antarctic Fish Have Very Similar AFGPs Even Though Distantly Related

BFCf No Relationship Seen between Fish Proteins and Morphology (e.g.; lungfish, "living fossils")

BFCg Coelacanth Hemoglobin Suggests Their Close Relationship to Terrestrial Vertebrates. But details are controversial.

BFCh Thyoxine Levels in Salmonoid Fish Corrrelated with New Moon and Migratory Action. An internal lunar clock?

BFCi Kidney Secretions Bind Fish Nests Together (e.g.; sticklebacks)

BFCj Sharks Renowned for Their Resistance to Infections. This is attributed to their ability to produce squalamine, an antimicrobial steroid. Why was this valuable ability not inherited by "higher" forms of life?

BFCk Persistent Claims that Moonlight Greatly Accelerates the Putrefaction of Fish.

BFCl Emission of Chemical Alarm Signals (i.e.; either to deter predators or attract additional predators to interfere with imminent attack) (e.g.; darters, gobies, etc.)

BFCm Females Select Males with Good Immune Systems by Their Odors (e.g.; sticklebacks)

BFD DISTRIBUTION OF FISH IN TIME AND SPACE

BFDa Marine Fish Adapted to Bodies of Fresh Water

a.1 With River Access to Sea (e.g.; Lake Nicaragua with sharks, sawfish, tarpon, and other species; Lake Sentani, New Guinea, with sharks and sawfish)

a.2 Lakes with No Reasonable

Marine Connections (e.g.; Lake Titicaca where sea-horses are rumored to live)

BFDb Fish Living in Crevicular Structure (i.e.; deep caves, aquifers, artesian wells)
b.1 Blind Fish in Caves (e.g.; many reports)
b.2 Sighted Fish Flowing from Artesian Wells (e.g.; trout)

BFDc Seamount Populations (i.e.; species biologically distinct from conspecific living in the open oceans) (e.g.; orange roughy) [BFBi]

BFDd Curious Disappearances of Fish
d.1 No Reappearances (e.g.; mature North American and European eels)
d.2 Massive Kill-Offs and Eventual Recovery (e.g.; North Atlantic tilefish in 1882, bodies thick in area 25 x 170 miles)

BFDe Widely Separated But Closely Related Species
e.1 Amiuridae Catfish (e.g.; many species in North America, only one in China)
e.2 Coelacanth (e.g.; off South Africa, off Comoro Islands, off Indonesia)
e.3 Lungfish (e.g.; Africa, Australia, South America)
e.4 Many Reef Species (e.g. separated by thousands of kilometers, but connected biologically by far-drifting larvae)

BFDf Many Pelagic Fish Have Abundance Cycles of about 50 Years

BFDg Strange Dispersal of Eel Larvae (i.e.; American-eel larvae reach West Atlantic in 1 year; European-eel larvae take 3 years to reach East Atlantic)

BFE THE FOSSIL RECORD OF FISH

BFEa Extremely Rapid Speciation in Recent Times (e.g.; cichlids, pupfish [BAAai]

BFEb Evolutionary Stasis ("Living Fossils") (e.g.; lungfish, bowfin, coelacanth, hagfish, lamprey, etc.)

BFEc Sudden Appearance of First Fish during Cambrian Explosion circa 550 Million Years Ago (i.e.; no likely ancestors known) (e.g.; Myllokunmingia)

BFEd Origin of Cartilaginous Fish Uncertain. (Apparently, they appeared after the bony fish.) (e.g.; sharks, skates, rays)

BFEe Fossil Record of Transition from Jawless to Jawed Fishes Called "Uncertain"

BFEf Transition from Fish to Tetrapods Controversial
f.1 Lobe-Finned Fish (i.e.; long considered closest to tetrapods lack digits and have different internal structures.) (e.g.; lungfish, coelacanths)
f.2 Ichthyostega (i.e.; a questionable candidate, but with seven digits)
f.3 Acanthostega, promising, but with eight digits and apparently fully aquatic,

BFEg Bone Beds, Mainly Fish (i.e.; immense bone deposits, inches thick, covering many square miles) (e.g.; Ohio Devonian bone beds, Lompoc bone bed of over a billion herring, etc. [See ESD2]

BFEh Claim for Periodicity in Extinctions (i.e.; roughly every 26 million years)

BFEi Fins Evolved Multiple Times in Primitive Fish

BFF PISCINE BODILY FUNCTIONS

BFFa Warm-Blooded Fish (i.e.; contrary to popular thought, a few dozen fish are endothermic) (e.g.; tuna, swordfish mackerel shark)

BFFb Unusual Respiration in Fishes
b.1 Air-Breathers (i.e.; via gills (e.g.; wooly sculpins, climbing perch, clingfish)
b.2 Skin-Breathers (e.g.; mudskippers, which also carry water supplies)
b.3 Reverse Breathing (i.e.; some bottom-dwelling rays reverse normal ray breathing cycle, inhale water on top, exhale through gills on

The three species of lungfishes burrow into the earth and breathe air during dry spells. (K.P.N. Shuker; The Hidden Power of Animals, p. 105, 2001.) [BFDe, BFFb]

bottom to avoid taking in sand) (e.g.; guitar-fishes)
b.4 Suspended Animation (e.g.; frozen fish can often revive)
b.5 Estivation (i.e.; suspended animation through hot-dry periods) (e.g.; African lungfish)

BFFc "Sleeping Sharks" (i.e.; in actuality, "torpor"; these sharks are found in caves on the Yucatan coast)

BFFd Nerve Regeneration (i.e.; achieved with help of electricity) (e.g.; lampreys)

BFFe Incubation and Nurturing
e.1 Mouth Breeders (e.g.; Indian fighting fish)
e.2 Pouch Breeders (e.g.; sea horses)
e.3 Incubation at Below 32°F (e.g.; an Arctic skate)
e.4 Incubation in Genital Tract (e.g.; some sharks and rays, nutritive fluids also provided)
e.5 Placental Sharks (i.e.; yolk-sac placentas) (e.g. sand tiger sharks)
e.6 Skin-Feeding of Young (e.g.; an Amazonian cichlid, (Symphysodon discus)

BFFf Spawning Phenomena
f.1 Lunar Timing of Spawning (e.g.; grunnions and many other species)
f.2 Interspecies Spawning (e.g.; all-female species, to stimulate egg development) [BSAa]
f.3 Some Salmon Return to Sea after Spawning (e.g.; King salmon)

BFFg Unusual Digestion Phenomena
g.1 Preservation of Food in Stomach
g.2 Digestion through the Skin (e.g.; eel larvae possess no digestive tract and apparently absorb nutrients through their skin)

BFFh Growth Never Ceases in Some Fish (e.g.; carp) [BRFn]

BFFi Salmon That Normally Die after Spawning Still Do So Even if Fed and Protected in Captivity

BFFj Fish Metamorphosis (How and why does such major bodily reconstruction occur?) (e.g.; salmon, flatfish)

BFG FISH GENETICS

BFGa mtDNA Study Indicates Coelacanths Genetically Far from Tetrapods (They are not, therefore, transitional species.)

BFGb Cichlids in African Lakes Show Almost No Genetic Divergence Despite Great Morphological Diversity (Similar to humans and chimpanzees!)

BFGc Great Fish Diversity (25,000 Ray-Finned Species) (This may be due to doubling of genes and other non-Darwinian modes of evolution.)

BFGd Evolutionary Stasis of Some Fish Attributed to "Linked Genes" (e.g.; three-spined stickleback)

BFGe Shark mtDNA Changes More Slowly Than That of Mammals

BFGf All-Female Species That Mate with Males of Other Species to Stimulate Parthenogenesis Occasionally Acquire Some of

Male's Genetic Material [BFFf]

BFGg Hybridization Important in Fish Evolution (According to the study of minnows in genus Gila)

BFGh Pufferfish Fugu rubripes has Smallest Genome of Vertebrates (i.e.; about as many genes as humans but only 1/3 the size due to scarcity of introns---as occurs also in birds) [BBG4]

BFGi In Blind Cavefish, Change in Gene Expression Claimed to Exchange Sight for More Teeth and Taste Buds

BFGj Fish Genes Transferred to Bacterium (e.g.; ponyfish to light-producing bacterium)

BFI INTERNAL STRUCTURES OF FISH

BFIa Presence of Brain-Heater Elements to Keep Organ Warm and Functional during Deep Dives (e.g.; swordfish, which are exothermic)

BFIb Almost Complete Degeneration of Skeleton (e.g.; gulper eel, which is mainly a bag of digestion fluids)

BFIc Increase of Number of Vertebrae with Latitude (For some flounders, 30 vertebrae in tropics, 60 in Arctic. Nature's rationale uncertain.)

BFId Ancient, Apparently Sudden Origin of Sophisticated Immune Systems. (In truth, paleontologists cannot say when immunity developed.) (e.g.; sharks)

BFIe Ancient, Sudden Origin of Circadian Clocks (See comment in BFId.) (e.g.; lampreys)

BFIf Complexity, Variety, and Sophistication of Bones in Vertebrates (i.e.; amazing composite structures of mineral and biological materials)

BFIg Presence of Magnetite (i.e.; possibly used in navigation) (e.g.; rays, tuna)

BFO FISH ORGANS

BFOa Fish with Unusually Large Brains (Such are needed mainly to process avalanches of electrical and acoustical data.) (e.g.; elephant fish with a brain 3.1% by weight, higher than humans)

BFOb Eye Degeneration in Dark Environments (Eye lens undergoes programmed death, rest of eye does not develop. Can be reversed by inserting lens from normal fish.) (e.g.; convergent evolution in many cave fish)

BFOc Eye Metamorphosis
c.1 Eye Migration to New Position (e.g.; flatfish)
c.2 Eye Changes in Fresh-Water Eels Preparatory to Migration. (The eye grows much larger, rounder, its color changes from yellow-green to silver, visual pigments change.)

BFOd Eyes Capable of Independent Movement As in Chameleons (e.g.; mudskippers)

BFOe Eye Modifications for Good Vision in Both Air and Water
e.1 Eyes Doubled into Two Functional Parts (e.g.; Anableps the "four-eyed fish")

The young of some deep-sea fishes are born with strange stalked eyes. (Sea Frontiers, 6:145, 1960.) [BFOc]

e.2 Double Images Produced Like Anableps But Oriented Vertically Rather Than Horizontally (e.g.; Galapagos blenny Dialommuus fuscus)
e.3 Corneas Flattened for Use in Air (e.g.; Mnierpes)
e.4 Fish with Pyramidal Corneas (The purpose behind the pyramids is uncertain.) (e.g.; flying fish)

BFOf Fish with Separate, Extra Eyes
f.1 Adjacent to Normal Eyes with Lenses and Retinas (e.g.; Bathylynchnops and some other deep-sea fish)
f.2 Eye-Like Organs of Varying Capabilities along the Body (e.g.; Stomias anguilliformis with eyes containing lenses, retinas, pigment layers)
f.3 Three-Eyed Fish (These are usually terata, such as occur in the fusion of a two-headed embryo.)

BFOg Remarkable Fish Retinas and Visual Pigments
g.1 Tiered Retinas (i.e.; more than one layer of visual receptors) (e.g.; conger eels with five layers) (It is unclear why such vision enhancement is necessary and why only these eels are the beneficiaries.)
g.2 Rod Pigments of Deep-Sea Fish Shifted to Peak at 480 Nanometers Instead of Normal 500 in Surface Waters
g.3 Enhanced Color Sense (e.g.; piranhas have infrared vision; sticklebacks have five different color-sensitive cones) (Humans possess only three types of color-sensitive cones!)
g.4 Patterns of Double Cones on Retina (They permit two orthogonal polarizations to be sensed usefully---a capability useful in murky water) (e.g.; green sunfish)
g.5 Use of Chlorophyll in Eye Pigments (i.e.; to see in the far-red) (e.g.; dragonfish)

BFOh Modifications for Breathing Out of Water and/or Oxygen-Poor Water
h.1 Functional Lungs (e.g.; lungfish, which also have gills)
h.2 Branchial ("Gill") Chambers Used Like Lungs (e.g.; rock skippers)
h.3 Swim-Bladders Used as Accessory Respiratory Organs (e.g.; gars, bowfins)
h.4 Stomach and Intestines Used for Respiration (e.g.; South American "catfishes," some loaches)
h.5 Special Lung-Like "Labyrinths" (e.g.; climbing perch)
h.6 Branchial Cavities and Special Pouches Filled with Water (e.g.; mudskippers, which also gulp air)
h.7 Mouth-Breathers (Such fish possess non-functional gills and no lungs) (e.g.; electric eels, which utilize folded tissue inside their mouths to extract oxygen.)

BFOi Taste Receptors on Fins (e.g.; sea robin)

BFOj Curious Compositional Variations in Fish Otoliths ("Ear-Stones")
j.1 Apatite (Calcium Phosphate) (e.g.; hagfish)
j.2 Aragonite (e.g.; primitive sharks, lungfish, coelacanths)
j.3 Various Forms of Calcite (e.g.; virtually all other fish and vertebrates in general)

BFOk Generation of Electricity by Fishes [BMO8]
k.1 Strong Electric Pulses (Used for defense and for the stunning of prey.) (e.g.; electric catfish, 300 volts, Nile and Congo rivers; electric eels ---not true eels---600 volts, South American rivers; electric rays, 300 volts, Atlantic Ocean) [BFTd]

An African, fresh-water, electric catfish can produce a 300-volt shock. (K.P.N. Shuker; The Hidden Power of Animals, p. 53, 2001.) [BFOk]

k.2 Weak Electric Pulses or Waves (These are employed for navigation, prey detection, communication, defense.) (e.g.; knifefish, South America; elephant fish, Africa; stargazers, Atlantic Ocean)

BFOl Lateral-Line Organs (Linear arrays of hair-like sensors. Water motion used for forming a sense of the surroundings and for maintaining position in schools.)

BFT FISH TALENTS AND CAPABILITIES

BFTa Presence of a Magnetic Sense as Determined in the Laboratory (e.g.; some salmon, skates)

BFTb Passive Electrosensitive Fish (Fish with sensors that detect electrical signals from hidden prey.) (e.g.; paddlefish, many sharks and rays)

BFTc Active Weakly-Electric Fish (Waves and pulses are used for communication, navigation, prey-location, distance measurement) (e.g.; knife fish, elephant fish)

BFTd Active Strongly Electric Fish (Strong pulses---as high as 600 volts---for defense, stunning and/or killing prey.) (e.g.; electric eels, electric catfish) [BFOk.1]

BFTe Electrical Sensors and Sources Have Appeared in Scores of Remotely Related Fish (Is this convergence or separate invention?)

BFTf Homing in Fish (Many species return to their natal rivers with surprising fidelity. The river-odor theory is prominent but controverted.) [BMT2]

BFTg Presence of Sound and Pressure Sensors

g.1 Ultrasound Detection (Over 180 Kilohertz) (Purpose of this capability is unclear.) (e.g.; American shad)

g.2 Infrasound Detection (Less than 20 Hertz) (Many sounds in the ocean are of very low frequency. Not surprisingly, many species are aware of them.)

g.3 Eddy and Current Detection (This capability is useful in locating and catching prey) (e.g.; some catfish)

g.4 Weather Prediction (Strong weather fronts and storms generate infrasound that agitates some fish.) (e.g.; "weather fish" or "thunder fish" are sometimes kept in European home aquaria)

g.5 Earthquake Prediction (Earthquake precursors may be atmospheric or seismic infrasound resulting in fish agitation.) (i.e.; many species appear in anecdotes telling of pre-quake fish activity) [BRTj]

BFTh Sound Production in Fish

h.1 Short Sound Pulses in Schooling Fish (Source not known, but apparently used as signals to school members.)

h.2 Musical or Singing Fish (i.e.; the ocean resounds with "fish music") (e.g.; drum fish, volcano fish, etc.)

BFTi Air Storage in Mudskipper Burrows (This suggests preplanning for high tide.)

BFTj Possible Powered Flight in a Fish (Observations of rapidly flapping pectoral fins, a buzzing sound, and short flights that seem to transcend the gliding of flying fish.) (e.g.; common hatchet fish of the Amazon) [BMT5, BRAf, BSAj]

BFX UNUSUAL INTERFACES BETWEEN FISH AND OTHER SPECIES

BFXa Humans

a.1 The Candiru, the Only Vertebrate Parasite of Humans (This small, very slim catfish invades the urogenital tract of unprotected swimmers in some

South American rivers. Surgery required for removal.) [BHX12]

a.2 Great White Shark (i.e.; humans are often released as unpalatable)

a.3 Barracuda (People are generally avoided, but one jumped in a boat and attacked a woman.)

a.4 Remoras (i.e.; fish with adhesive organs used by fishermen to catch fish.

BFXb Other Mammals

b.1 Whales (Anecdotes of great battles between swordfish and whales.)

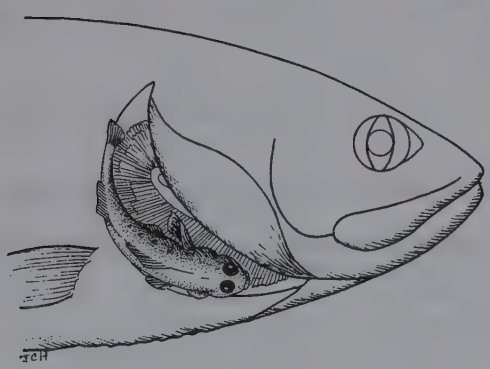
b.2 Dolphins (Tuna schools congregate below dolphin schools fishing on surface, reason unknown.)

BFXc Other Fish

c.1 Many Species (So-called "cleaner fish" remove parasites from many piscine "clients" in safety.)

c.2 All-Female Species (These females mate with males of other closely-related species. The alien sperm initiate parthenogenesis.) [BFFf, BFGf]

c.3 Many Species of Small Fish Live inside the Mouths and Gill Cavities of Much Larger Fish.)



Some fish live within the gill cavities of larger fish. (Scientific Monthly, 24:556, 1927.) [BFXc]

c.4 Mouth-Breeding Cichlids, Lake Tanganyika (Here an endemic catfish becomes a brood parasite by somehow mixing its eggs with those in the mouth of the host fish.)

BFXd Sea Cucumbers (a Holothurian) (The pearlfish insert their entire bodies tail-first into the anus and thence into the body cavity for protection.)

A pearlfish (or fierasfer) enters the anus of a sea cucumber tailfirst for shelter. (English Mechanic, 33:302, 1881.) [BFXd]

BFXe Anemomes (Several species of clown fish live safely among the anemome's stinger-covered arms.)

BFXf Bacteria (Various bacteria provide the luminous displays of flashlight fishes and many other species.)

BFXg Jellyfish

g.1 Fish-Portugese Man-o-War Symbiosis (The latter is actually a colonial organism.)

g.2 Young Codfish Are Apparently Not Harmed by Predatory Jellyfish

BH HUMANS[13,14,15]

BHA	EXTERNAL APPEARANCE AND MORPHOLOGY
BHB	ANOMALOUS HUMAN BEHAVIOR
BHC	HUMAN CHEMICAL AND PHYSICAL ANOMALIES
BHE	THE HUMAN FOSSIL RECORD
BHF	HUMAN BODILY FUNCTIONS
BHG	HUMAN GENETICS
BHH	HUMAN HEALTH ANOMALIES
BHI	INTERNAL SYSTEMS AND STRUCTURES OF HUMANS
BHO	HUMAN ORGANS
BHT	UNUSUAL HUMAN SENSES AND FACULTIES
BHU	UNRECOGNIZED LIVING HOMINIDS
BHX	HUMAN INTERFACE PHENOMENA

As one would expect, humans have been the most thoroughly studied of all biological entities. The BH section of this volume is consequently the longest and the repository of some of the most profound anomalies and intriguing curiosities. By way of introduction, a short sampling of section highlights is in order.

- Humans and chimpanzees have virtually identical genomes but are strongly divergent in morphology and behavior;
- Several human features support the so-called "aquatic ape" stage in human evolution; i.e.; hairlessness, subcutaneous fat, diving reflex, etc.;
- Our inability to decide whether we are robots living in a virtual world;
- Our frequently irrational behavior (wars, environment-destruction, etc.)
- The sudden explosion of human culture about 40,000 years ago;
- The present fluid and confused nature of the human fossil record;
- The lack of a human-female estrous cycle;
- The apparent continuing degeneracy of the male Y-chromsome;
- The surprisingly small size of the human genome in view of our complexity and the larger genomes of other, "simpler," species;
- The spontaneous regression of some human cancers;
- Phantom-limb phenomena
- The unknown nature of the information transmitted via the central nervous system (format, conventions, etc.);
- The strange history of human color vision;
- The fact that the lifetime total of an average human's heartbeats is thrice that of other mammals;
- Our mental capabilities far exceed those needed for survival (as in our musical and mathematical talents); and
- Weak evidence that other living hominids exist.

BHA EXTERNAL APPEARANCE AND MORPHOLOGY

BHA1 Human External Asymmetry (This can be seen easily in faces. Why should such asymmetry occur when the genome is identical on both sides of the body? Of course, bodily asymmetry is more profound internally.) [BHIc]

BHA2 The Claimed Sudden Appearance of Beauty in the Human Lineage (This subjective property is said to have appeared with the Cro-Magnon culture in Europe 40,000 years ago!) [BHB14, BHH11, MACb]

BHA3 General Physique Correlated with the Month of Birth
3.1 Winter Births Heavier and Taller
3.2 Spring Births Are Taller

BHA4 Human Body Badly Designed for Swimming (It has low buoyancy compared to other mammals---due to more fat.) [BHI14]

BHA5 The Apparent Physical Degeneration of Humans (A claimed general decline in strength and disease resistance over the last 30,000 years.)

BHA6 Human Physical Degeneration Correlated with Genius (Genius also correlated with mental illnesses.) [PIGa]

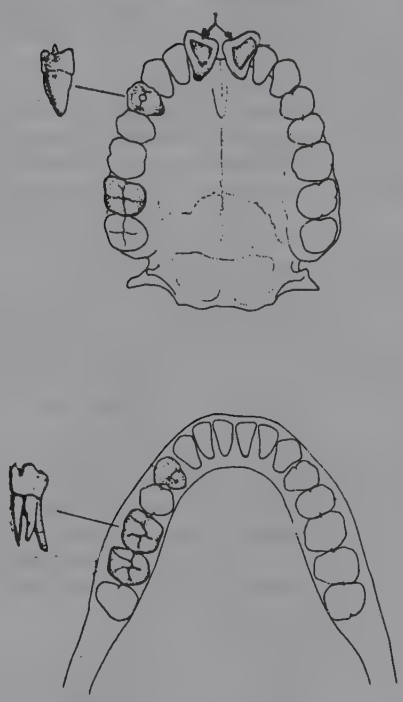
BHA7 Variability of External Appearance (This is claimed to be too great in modern man to have evolved in just the last 30,000 years.)

BHA8 Discordances in the Appearances of Identical Twins (The differences are appreciable despite strong similarity of genomes.)

BHA9 Mirror-Image Twins (In such twins, hair whorls, handedness, etc. are mirrow images of each other. The phenomenon extends to psychology and pathology. Why does this occur in some twins and not others?)

BHA10 The Apparent Juvenile Character of Some Features of the Human Body (As in the human facial profile and unopposable toes. Humans are technically "neotenous.")

SHOVELED INCISORS



Northern Asians and Native Americans possess strongly shoveled incisors. Their molars also have different numbers of roots compared to other populations. (B.M. Fagan; The Journey from Eden, p. 196, 1990.) [BHA7]

BHA11 Human and Orang-Utan Physiological Similarities. (These are stronger than with the other great apes, despite greater genetic differences. Similarities include teeth and the lack of estrous cycle.)

BHA12 Significant Morphological Differences between Humans and the Great Apes (Despite virtually identical genomes, particularly in the case of the chimpanzees.)

BHA13 Sports, Monsters, Terata (e.g.; Siamese twins, etc.) Are Not Considered Anomalous

BHA14 Two Separate Populations of Pygmies (There are large genetic and geographical

separations between African Pygmies and Asian Negritos. Did they evolve independently?)

BHA15 Birth Weight Varies with Month of Birth (It Peaks in May in Northern Hemisphere, in December in Southern)

BHA16 Human Sexual Dimorphism (This is atypical among primates in general but not the great apes. Why?)

BHA17 Sex-Ratio Variations
- 17.1 Very Large Geographical Variations
- 17.2 U.S. Presidents Produced 90 Sons/61 Daughters as of 2000
- 17.3 The Soldier Effect (i.e.; more boys born after wars)
- 17.4 Fathers Working at Nuclear Plants Produce More Sons
- 17.5 Dominance of Sons in Some Families (e.g.; over 200 years)

BHA18 Gradations between Male and Female (There are so many that the Y-chromosome theory is deemed inadequate to explain them. The male Y-chromosome is very small and apparently getting smaller.)

BHA19 The Sacral Spot (This colored spot appears in infancy and is notable in the Japanese, Eskimos, and Mayans. The spot bears upon the populating of the New World.) [MAA]

BHA20 Presence of a Linear Pigmentation Peculiarity on the Upper Arms of Some Blacks

BHA21 Spotted or Piebald People (i.e.; white spots, sometimes inheritable)

BHA22 Visible Radiation Emitted by the Human Body [BHA24]
- 22.1 Luminous Wounds (i.e.; usually due to bacteria)
- 22.2 Famous Luminous Woman of Pirano
- 22.3 Neuropathic Halos

BHA23 Unidentified, Problematical Radiation Emitted by the Human Body (i.e.; claims of N-rays, I-rays, V-rays, mitogenetic radiation)

BHA24 The Supposed Human Aura (A luminous fringe claimed to exist by psychics.) [BHA25]

BHA25 Kirlian Photography of the Postulated Human Aura (An effect obtained only through the use of high-frequency electrical fields.)

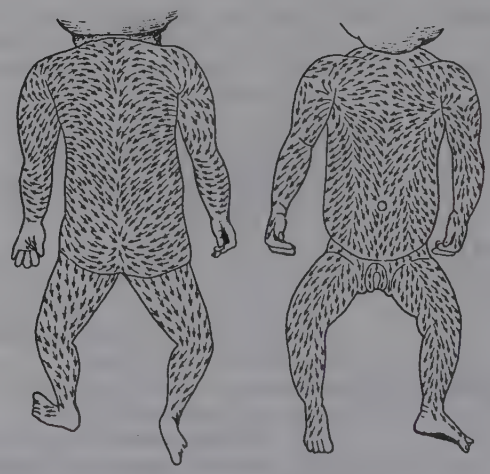
BHA26 Excessively Hairy Humans
- 26.1 Inheritance of Phenomenon (e.g.; famous Burmese family)
- 26.2 Correlation with Dental Abnormalities (e.g.; toothlessness)
- 26.3 Retention of the Lanugo (Fetal Hair) Long after Birth

BHA27 Sudden Loss of Hair and (Sometimes) Regrowth (Fright or stress are possible causes.)

BHA28 Baldness among Musicians (A casual observation. Said to be most common among the brasses!)

BHA29 Human Hairlessness (i.e.; in comparison to other primates)

BHA30 Curious Human Hair Patterns (i.e.; "flow" patterns, sacral whorls, hairy pinna)



Hair tracts on a human foetus show a flow pattern. This characteristic is said to support the "aquatic-ape" theory. (New Scientist, 7:642, 1960.) [BHA30]

BHA31 Sudden Blanching of the Hair (Often occurring within hours of injury or fright.) [BMA17]
- 31.1 Blanching Physiological Mechanism Not Understood

31.2 Role of Individual's Psychological State Unknown

BHA32 Sudden Color Changes in Human Hair (Excluding Blanching)

BHA33 Claims that Hair Color Is Correlated with Eminence (e.g.; political reformers said to tend to be fair-haired)

BHA34 Hair Color Correlated with Strength and Vitality (Darker is better according to questionable studies.) [BHA38]

BHA35 Remarkable Persistence of Hair Growth after Death (i.e.; growth may persist for a year or more)

BHA36 Voluntary Erection of Body Hair (i.e.; arm hair)

BHA37 Night-Shining in Human Eyes (Rare, problematic, but said to be orange)

BHA38 Eye Color Correlated with Athletic Capability (e.g.; dark eyes slightly superior) [BHA34]

BHA39 Inherited Ear Pits (These occur where ears are usually pierced. Could this be an expression of Lamarckism?)

BHA40 Supernumerary Ears and So-Called Gill-Slits

BHA41 Nostril Downward Orientation and Associated Musculature (In these, humans are different from most other primates. Pluses for the Aquatic Ape theory.)

BHA42 Differences and Similarities between Human and Primate Teeth (Differences in canine size, enamel thickness, etc. The differences widen in the second dentition.)

BHA43 Racial Dental Differences (e.g.; the loss of lateral incisors in many of Celtic extraction.) [BHE10]

BHA44 Historical Shrinkage of Human Teeth over the Last 100,000 Years

BHA45 Unusual Dentitions
45.1 Extra Dentitions a Rare Phenomenon among the Aged
45.2 Babies Born with Full Sets of Teeth
45.3 Some Eskimos with Bony Ridge of Pseudoteeth

BHA46 Human "Horns" (Not true horns, but large skin outgrowths from the head and other parts of the body.)

BHA47 Unusual, Inherited Characteristics of Feet (e.g.; prehensile capabilities)

BHA48 Progressive Loss of the Little Toe

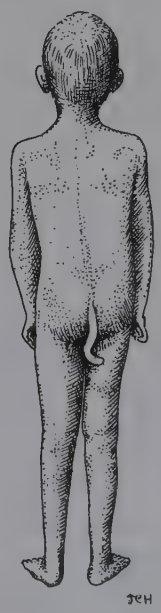
BHA49 Webbed Hands and Feet (i.e.; webbed toes surprisingly common)

BHA50 Alleged Primitive Character of Human Hands and Feet (i.e.; as compared to other vertebrates)

BHA51 Large Size of Female Breasts and Buttocks (i.e.; very large relative to other primates)

BHA52 The Unusual Location of Human Breasts (Like those of the sirenians and elephants, not most mammals.)

BHA53 Human Tails (These are rare and usually small and fleshy, those with vertebrae are extremely rare.)



A Moi boy with a 9-inch-long "tail." (Scientific American, 60:295, 1889.) [BHA53]

BHA54 Concordance of Human Embyro Growth and Evolutionary Developments (i.e.; noted when plotted against time)

BHA55 The Production of Anomalous Human Odors
55.1 During illnessses (e.g.; in schizophrenia)
55.2 Before Death
55.3 After Coitus
55.4 Mate Selection by Odor Leads to Healthier Children
55.5 Claims of "Psychic Odor" (i.e.; "ghost" odors!)

BHA56 Natural Human Vibrations (Detectable in the laboratory, these are minute, whole-body vibrations at 6-12 Hertz of uncertain origin.)

BHAa Breast Growth Enhanced by Hypnosis

BHAb Presidential Stature Correlated with Competence (e.g.; Lincoln, Jefferson)

BHAc Origin of the Brown Line (Linea Nigra) on Stomachs Pregnant Women

BHAd Humans as Robots (We cannot prove we are not!)

BHAe Reproductive Success Correlated with Male Height

BHAf Human Proportions Reflect the Golden Ratio (e.g.; height of navel above ground divided by height)

BHAg Humans Nuturing Large Foetuses of Unborn Twin (One teen found with a dead, highly developed 4-pound twin retained in body.)

BHAh Female Hormone Production Rate Correlated with Perceived Beauty (Obviously, judgment calls!)

BHAi Small People with Elfin Features (Williams Syndrome) (Is there a connection with the old, worldwide myths (?) of "little people"?) [MAAa]

BHAj Change of Eye Color with Age (i.e.; this is probably a genetic effect)

BHAk Cases of Skin Color Correlated with Atmospheric Conditions (e.g.; changes from grey to purple)

BHAl Sexual Characteristics Correlated with Lengths of Fingers
1.1 Male Fertility
1.2 Sexual Orientation

BHAm Anomalous Sound Production
m.1 Clock-Like Ticking in Head
m.2 Knocking Sound from Sleeping Individual

BHAn The Devil's Spots (i.e.; small red or blue spots on obscure parts of body associated with witches)

BHAo Pinnas of Ears Help Brain Form Acoustical Maps of One's Surroundings

BHAp Skull Shapes Correlated with Geographical Origin

BHAq Neanderthal Characteristics Claimed to Exist in Some Modern Humans (e.g.; skull shape, etc., suggestive of hybridization circa 30,000 years ago.)

BHB ANOMALOUS HUMAN BEHAVIOR

BHB1 Apparently Irrational Human Behavior (e.g.; warfare, destruction of environment)

BHB2 Similarities in the Behaviors of Identical Twins Reared Apart (Nature over nurture?)

BHB3 Correlation of Disturbed Human Behavior and Solar Activity (As reflected in hospital admissions.)

BHB4 Correlation of Disturbed Human Behavior and Lunar Phase (The claims of homicides, suicides, etc., are controversial.) BHH4, BHHz]

BHB5 Correlations of Disturbed Human Behavior, Stormy Weather, and Infrasound (As seen in accident rates, absenteeism.) [BMT4]

BHB6 Correlation of Human Behavior and Climate and/or Season of the Year (e.g.; insanity, male violence toward women)

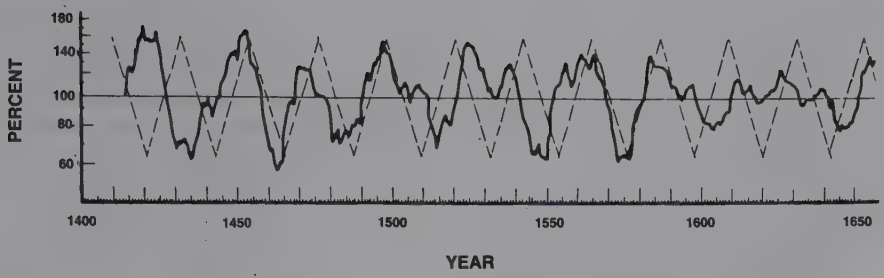
BHB7 Unusual Behavior Induced by Rhythmic Stimuli (e.g.; trance induction) [BHH8, PBHa]

BHB8 Cyclicity of Violent Collective Behavior (e.g.; wars, revolutions)

BHB9 The Curious Relationship between the Number of Wars and the Number Killed in Them

BHB10 Correlation of Economic Activity with Solar Activity (Including Jevons' first correlations and and subsequent "sunspottery" fad.)

BHB11 Correlation of Economic Activity



A 22-1/5 year cycle seems to exist for international battles. (E.R. Dewey; Cycles, p. 145, 1971.) [BHB8]

with the Lunar Tidal Forces

BHB12 Correlation of Economic Activity with Solar-System Configurations (e.g.; Jupiter alignment)

BHB13 Periodicities in Various Economic Parameters
- 13.1 3.5-Year Corn-Price Cycle (Many similar short cycles are claimed by cycle students.)
- 13.2 Long-Waves or Kondratieff Waves (i.e.; boom-bust cycles)

BHB14 Human Culture: An Enigma of Evolution (See MAC for more detail.) [BHA2, BMB6]
- 14.1 Religiousness
- 14.2 Art and Music
- 14.3 Science and Mathematics

BHB15 Cycles of Religiousness (A 9-year cycle seems prominent.)

BHB16 "Flock Behavior" in Human Groups [BBB38, BFBi]
- 16.1 Chorus Lines
- 16.2 Spontaneous Synchronized Clapping

BHB17 The Evolution and Persistence of Altruism and "Team Playing" (The reality of altruism is assumed here.)

BHB18 The Evolution and Persistence of Homosexuality

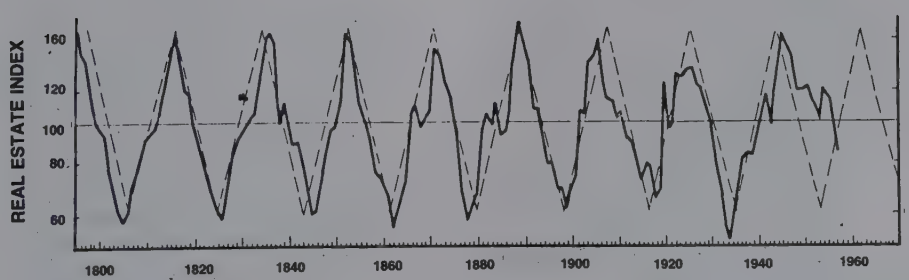
BHB19 Unusual Human Sexual Activity
- 19.1 Continual Sexual Receptivity
- 19.2 Face-to-Face Copulation

BHB20 The Puzzle of Highly Asymmetric Human Handedness (i.e.; about 90% of humans are right-handed)

BHB21 Handedness Correlated with Longevity (i.e.; right-handers live longer) (Why?)

BHB22 Handedness Correlated with Health (i.e.; righter-handers are healthier) (Why?)

BHB23 Handedness Correlated with Mathematical and Verbal Abilities (i.e.; left-handers superior) (Why?)



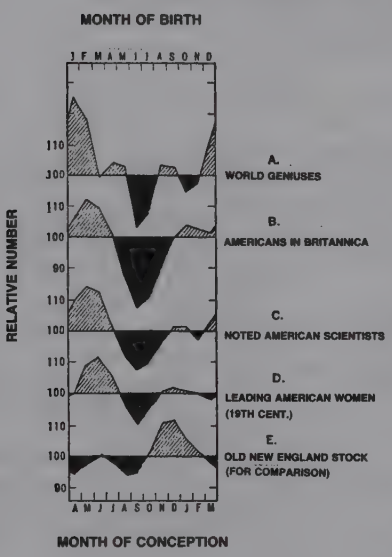
The 18.3-year cycle in real-estate activity, 1795-1958. (E.R. Dewey; The Mysterious Forces that Trigger Events, 1971.) [BHB14]

BHB24 The Uniqueness of Human Bipedalism

BHB25 Human Asymmetry in Locomotion (i.e.; tendency to walk in circles in absence of cues)

BHB26 Wolf-Children (e.g.; the Midnapore wolf-girls)

BHB27 Eminence Correlated with Time of Birth (Revolutionary thinkers tend to be born in cold-weather months.)



Month-of-birth for eminent people. (Cycles, 4:336, 1953.) [BHB27]

BHB28 General Eminence Correlated with Planetary Position; (i.e. astrology) (e.g.; there are some interesting claims of correlations with the Martian day)

BHB29 Eminence in Sports Champions Correlated with the Position of Mars; the "Mars Effect"

BHB30 Cultural Creativity Correlated with Increases in Solar Activity

BHB31 Cultural Flowering Correlated with Onset of Cooler Climate (e.g.; the 40,000-B.P. burst of European culture) [BHBy, MACb]

BHB32 Eminence and Order of Birth (First-borns are favored.) (e.g.; Goethe. Milton, etc.)

BHB33 Periodicity in the Population of Living Eminent People (There seems to be a cycle about 400 years long in Western civilization.)

BHB34 Eminence Correlated with Longevity (e.g.; Humboldt, Newton, Galileo, etc.)

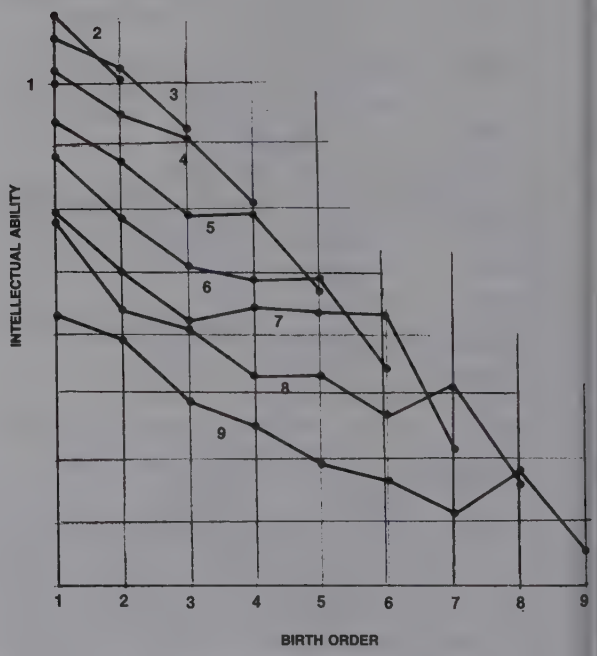
BHB35 Intelligence Correlated with Season of Birth
35.1 Portugese Study Claims Spring Months Favored
35.2 Japanese Study Claims Summer Months Favored

BHB36 Intelligence Correlated with Birth Order (e.g.; early-borns tend to have higher IQs)

BHB37 Intelligence Correlated with Myopia (e.g.; as ascertained by SAT math scores)

BHB38 A Relationship between Intelligence and Flicker-Frequency Response

BHB39 Increasing Intelligence with Vitamin Intake (e.g.; vitamins enhance non-verbal IQs)



Intellectual ability (IQ) versus birth order. The numbers indicate the number of children in the family. (Psychology Today, 8:37, January 1975.) [BHB36]

BHB40 The Similar Intelligences of Identical Twins Reared Apart [BHA8]

BHB41 Likelihood of College Matriculation Correlated with Season of Birth (e.g.; winter births favored)

BHB42 Sex Differences on Various Intelligence Tests
42.1 Males Score Higher on Tests Except as Noted Below
42.2 Women Score Higher in Reading Comprehension, Perceptual Speed, Associative Memory

BHB43 Intelligence Correlated with Stature (i.e.; taller people favored)

BHBa Claims That Personality Is Correlated with Astronomical Factors (There are serious students of astrology.)

BHBb Genetic Influence on Cognitive Abilities (i.e.; intelligence is mostly inherited)

BHBc General, Long-Term Worldwide Changes in IQs
c.1 Increase Claims
c.2 Decrease Claims

BHBd Human Intelligence Spurts Correlated with Past Environmental Cataclysms [BHB31, BMB6]

BHBe Lefties Superior to Righties in One-to-One Combat

BHBf Babies Prefer Foods Eaten by Mother during Pregnancy

BHBg Imitative Learning Unique in Humans (Still doubted by some scientists.)

BHBh Impossibility of Tickling One's Self

BHBi Female Preference for Male Faces Changes during Menstrual Cycle

BHBj Unusual Crowd Behavior
j.1 Panics in Exiting Doors of Enclosures (i.e.; often following some crowd stimulus)
j.2 Irrational Strategies in Entering Crowded Train Doors, etc.

BHBk Human Habit of Sticking Out the Tongue While Concentrating

BHBl Intelligence as a Pathogen (e.g.; irrational destruction of environment)

BHBm Claim That Behavioral Characteristics Can Be Transferred via Organ Transplants (If so, what is the medium?)

BHBn Meme Phenomena (i.e.; the propagation of religion and other societal factors) [BHBaa]

BHBo Claim that Music Improves Mental Performance (i.e.; the Mozart Effect)

BHBp Motherhood Improves Learning and Memory

BHBq Subconscious Inclination of Artists to Employ the Golden Ratio in Their Work

BHBr Humans Are the Greatest Force for Evolution (As seen in the development of drug resistance, pesticide resistance, and similar responses of Nature.)

BHBs Baby Hand-Babbling (i.e.; hand motions resemble voice-babbling)

BHBt Mathematical Ability Is Divorced from Social Skills

BHBu Intelligent People Have Fewer Offspring (Does this contradict "survival of fittest.")

BHBv Humans Are Entranced by Music Despite Apparent Its Lack of Survival Value

BHBw Pareto's Law Invariant in All Cultures (The rich always get richer while the poor always get poorer.)

BHBx Homosexuals More Likely to be Lefties

BHBy Cognitive Powers and Alertness Increase in Winter [BHB31]

BHBz The Assertion That Intellect, Being Nonmaterial, Can Not Have Evolved in the Darwinian Sense [BMB6]

BHBaa Human Social Chacteristics Are Evolvable in the Guise of "Memes" [BHBn]

BHBab Behavior Affected by Very Low-Frequency Atmospherics (i.e.; electromagnetic waves) (Perhaps infrasound is meant here.)

BHC HUMAN CHEMICAL AND PHYSICAL ANOMALIES

BHC1 Electric People (Individuals apparently characterized by

high electrostatic potentials.) (e.g.; the Georgia Wonder-Girl) (Beware stage tricks with such phenomena.)

BHC2 Magnetic People (Individuals who claim to be able to deflect compass needles and induce electric currents.) (e.g.; U. Geller)

BHC3 Body Electric Potentials Correlated with Lunar Phase

BHC4 Brain Electricity (EEGs) (See BHO21.)

BHC5 Survival of Very High Body Temperatures (i.e.; far above the 108°F, usually thought to be lethal)

BHC6 Unusual Body-Temperature Cycles (i.e.; departures from the normal 24-hour cycle)

BHC7 Anomalous Human Combustion (SHC) (A fringe phenomenon defined as the mysterious, nearly complete combustion of the human body in the absence of external ignition and sufficient fuel.)

BHC8 Retarded Decay of the Human Body (Claims of preservation over centuries, especially in the "incorruptibility" of some Catholic saints.) (e.g.; Saint Clare of Montefalco)

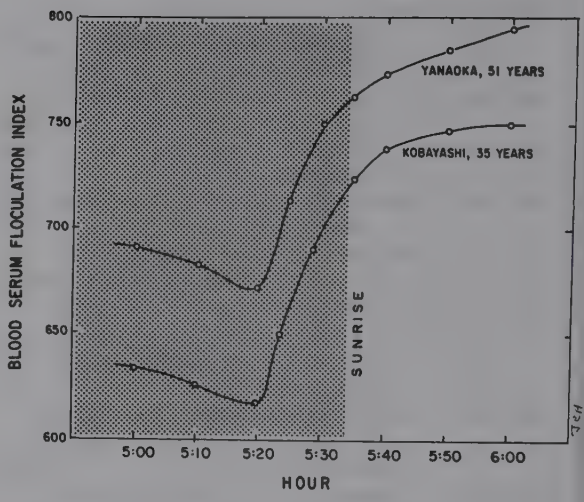
BHC9 Imbalances in Element Ingestion and Excretion (Claims by L.C. Kervran and others that elements are transmuted in the bodies of humans and other animals. Another fringe phenomenon.)

BHC10 The Human Inability to Synthesize Ascorbic Acid (This deficiency is spotty in other animals.) [BBC8, BMC4]

BHC11 Blood-Chemistry Variations (The so-called Takata reaction, which is claimed to be correlated with astronomical variables.)

BHC12 The Existence of Blood Polymorphisms (There are many different blood types, which appear to have no survival value. In fact, they are sometimes disadvantageous.) [BHC15]

BHC13 The Complexity, Variability, and Ubiquity of Hemoglobin in Animals (Why so many varieties?)



The claimed Takata reaction shows a "sunrise effect" in blood-chemistry. (M. Gauquelin; The Scientific Basis of Astrology, p. 211, 1969.) (Note: Gauquelin found no "scientific" basis.) [BHC11]

BHC14 Geographical Anomalies in the Distribution of Blood Groups (There are strange similarities among supposedly unrelated cultures) (e.g.; Irish and Icelanders) [MABa]

BHC15 Blood Chimeras (Individuals with more than one blood type, usually that of a fraternal twin.)

BHCa Female Hormones Increase in Fathers after the Birth of their Children

BHE THE HUMAN FOSSIL RECORD

BHE0 Remarkable New Hominid Skeletal (Almost every week new human-fossil finds are reported from Africa and Eurasia. The entries below will surely be outdated quickly and the hypotheses framed to explain them likewise.

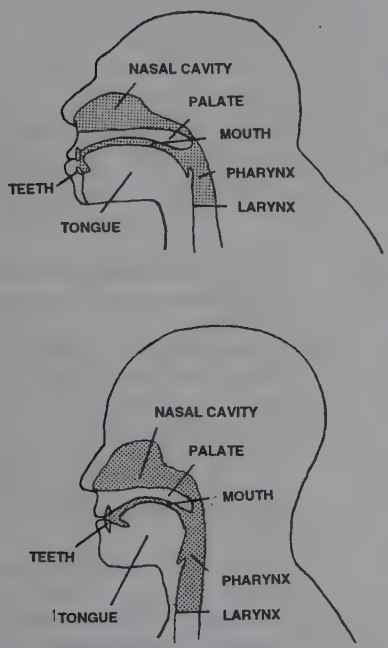
BHE1 Absence of Transitional Fossils (e.g.; between H. erectus and H. sapiens)

BHE2 Abrupt Changes in Hominid Morphology (e.g.; H. habilis to H. erectus and apparent sudden appearance

of Cro-Magnon man in Europe)

BHE3 Hominid Evolutionary Stasis (e.g.; H. erectus over 1 million years)

BHE4 Hominid Devolution (e.g.; decrease in brain size with H. sapiens) [BHE7]



Structures of hominid vocal tracts. (Top) H. erectus and H. neanderthalensis. (Bottom) H. sapiens. The key difference is the descended larynx in modern humans. (J. Goodman; The Genesis Mystery, 1983.) [BHE4]

BHE5 The Sudden, Unexplained Disappearance of the Neanderthals from the Fossil Record

BHE6 Taxon Variability or "Fuzz" (The incredible number of different, frequently intergrading hominid taxons. The implication is one of an extremely incomplete scenario of hominid development.)

BHE7 Hominid Gracilization (A marked trend toward lighter and more delicate skeletons.) (e.g.; Neanderthals to modern man) [BHE4]

BHE8 Discoveries of Giant Hominid Skeletons (i.e.; more than 10 feet in height)

BHE9 Discoveries of Very Small Hominid Skeletons (i.e.; less than 4½ feet in height)

BHE10 Some Hominid Skeletal Curiosities (e.g.; missing middle incisors in some Neanderthals) [BHA43]

BHE11 Hominid Fossil-Sequence Anomalies

11.1 Appearance of Hominid Species before Their Supposed Predecessors) (e.g.; archaic H. sapiens before H. neanderthalis)

11.2 Evidence That H. sapiens Did Not Evolve on the African Savannahs (Seacoast evolution hinted at by some fossils, supporting the Aquatic Ape hypothesis.)

11.3 Evidence of Hybridization between H. sapiens and H. neanderthalis [BHEa]

11.4 Marked Morphological Differences between H. sapiens and H. neanderthalis (Perhaps modern man did not evolve from the Neanderthals)

11.5 Neanderthal Skeletal Material Suggesting Cultural Sophistication (e.g.; burials with flowers)

BHE12 Anomalous Geographical Distribution of Hominid Skeletal Material (e.g.; human bones in North America older than 25,000 years) [See MAE.]

BHE13 Hominid Skeletal Material in Ancient Geological Formations (e.g.; the Freiberg coal skull) [MAE]

BHEa Modern Human Skeletons with Neanderthaloid Features Suggestive of Hybridization BHE11]

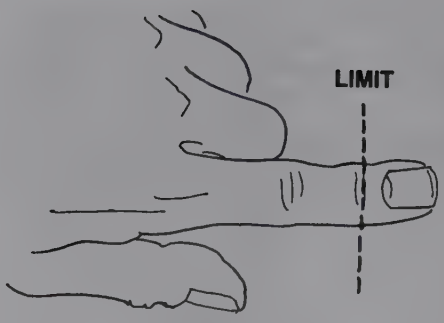
a.1 Skeletons from North American Mounds (e.g.; Illinois and Nebraska) [BHE12]

a.2 Greenland Skeleton Called "Gandar Man" [BHE12]

a.3 European Skeletons with an Apparent Mixture of Cro-Magnon and Neanderthal Characteristics (e.g.; from Portugal, 24,500 B.P.)

a.4 Some Living European Possess Some Neanderthal Characteristics [BHA7]

BHEb Coexistence of Several Hominid Species
BHEc Evidence of Delayed Maturation of H. sapiens Children
BHEd Possible Existence of Non-Hominid Tool Makers (Even modern chimpanzees use stone tools for cracking nuts. The stone flakes left behind look deceptively hominid-made.)
BHEe Pre-Clovis Skeletal Material in North America [MAE]
BHEf Early Lake Mungo (Australia) Skeletal Material



Limb regeneration in human children is limited to the fingertips. (Science, 217: 747, 1982.) [BHF13]

BHF HUMAN BODILY FUNCTIONS

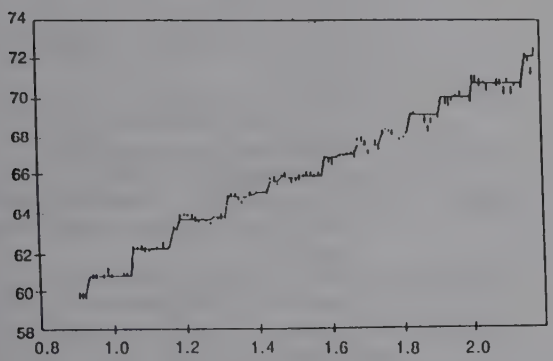
BHF1 Unusual Architecture of the Human Breathing Apparatus (e.g.; our descended larynx)
BHF2 Anomalously Slow Breathing in Some Individuals (Can be as slow as one-third normal rate.)
BHF3 Nostril Cycling (i.e.; changing nostril dominance) [BHOx]
BHF4 Anomalous Number of Breaths per Lifetime (Thrice that of mammals of comparable size. Admittedly this is a peculiar statistic, but it must have some fundamental significance.)
BHF5 Fiery Breaths (These may ignite spontaneously or by means of a match!)
BHF6 Cases of Human Rumination (The return of food to the mouth for further mastication.)
BHF7 Nondigestion of the Stomach Lining
BHF8 Anomalous Objects Found in the Stomach (e.g.; "bezoars")
BHF9 Bleeding Correlated with Lunar Phase [BHF29, PPSa. PPSi]
BHF10 Claim That Spontaneous Hemorrhages Are Correlated with Astrological Factors
BHF11 The Unusual Nature of Skin-Wound Healing in Humans (The human layer of subcutaneous fat impedes wound closure, as also occurs in marine mammals.) [BHI14, BHHad, BMI3]
BHF12 The Efficacy of Electricity in Healing (e.g.; especially in bone healing)
BHF13 Limb Regeneration in Humans (This is restricted to fingertip regeneration only.) [BMF5]
BHF14 The Relationship between Menstrual and Lunar Cycles
BHF15 Synchronization and Control of Menstrual Cycles (Common among closely associated women and is apparently effected via pheromones.) [BHTc]
BHF16 Menstruation from Unlikely Spots (e.g.; breasts, eyes)
BHF17 Body Potential-Difference Spike during Menstruation
BHF18 Remarkable Aspects of the Human Female Sexual Cycle
18.1 Lack of Estrous Cycle
18.2 Existence of Menopause in Humans (i.e.; very rare phenomenon in mammals) [BHFb, BMFa]
BHF19 Male Menstruation (Usually through the urethra.)
BHF20 Tolerance of the Placenta (To the mother's immune system, this is a foreign object.) [BHI4]
BHF21 Maternal Impressions (These are marks on or deformities of children claimed to be related to events during pregnancy. Obviously, these are not taken seriously today!) [BRBk]
BHF22 Telegony (The supposed influence of a previous father upon children of the same mother by a subsequent father.)
BHF23 Birth-Frequency Correlated with Day-of-the-Week

BHF24 Birth-Frequency Correlated with Month-of-the-Year

BHF25 Birth Rates Correlated with Lunar Phase

BHF26 Anomalous Variations in Twin and Multiple Births (There is a large variation in the frequency of multiple births with geography.)

BHF27 Unusual Growth Rates in Children [BHFm]
27.1 Extremely Rapid Growth (e.g.; 3 inches/week)
27.2 Cyclic Growth Spurts



Daily length measurements (in centimeters) for a male infant versus age, illustrating growth spurts. (Science, 258:801, 1992,) [BHF27]

BHF28 Human Thermal Control: A Uniquely Bad Design

BHF29 Colored Perspiration (This may be a psychogenic phenomenon.) [PPSa, PPSi]

BHF30 Emotion-Stimulated Tears (A phenomenon otherwise restricted to elephants and marine mammals.) [BMFb]

BHF31 The Lack of Any Measurable Biochemical Value of Sleep [PBZe]

BHF32 Lunar Control of the Sleep Cycle

BHF33 Voluntary Suspended Animation (e.g.; the famous "Sleeping Fakirs")

BHF34 Human Mortality Correlated with Geomagnetic Activity
34.1 Death rate Correlated with Solar Activity, in Consequence, Geomagnetic Activity
34.2 Sudden Death Syndrome (SDI) Correlated with Geomagnetic Pulsations

BHF35 Nearly-Simultaneous Deaths of Twins (The twins may be far-separated geographically.) [BHH9]

BHF36 Curious Attitudes after Death (i.e.; rigidity of corpses in odd positions at death)

BHFa Geophagy (Earth-Eating in Humans) (Suprisingly common in humans, other mammals and birds do it, too.)

BHFb Why Did the Menopause Evolve in Humans? (The evolutionary value of life beyond human menopause is implied!) [BHF18, BMFa]

BHFc Controversial Purpose of REM Sleep (Assuming one exists!) [BHF31, PBZ]

BHFd Curious Effects of Anesthesia
d.1 Patient's Memory of Conversations [BHT13]
d.2 Ignorance of Physiological Mechanism Producing Anesthesia
d.3 Ignorance of Why Xenon (an Inert Gas) Is an Anesthetic

BHFe Evidence of Increasing Human Infertility [BHFi]

BHFf Rapid Fetal Growth Correlated with Solar Activity

BHFg Controversy over Evolution of Sex and Its Significance to Life in General

BHFh Synchronism of Births among Daughters Who Are Not Twins

BHFi Decline in Human Sperm Counts and Quality [BHFe]

BHFj Timing of Birth Is Initiated by the Fetus

BHFk Embryo Development Controlled by External Chemical Signals

BHFl Seasonal Cycles in Autistic Births (i.e.; a widespread phenomenon)

BHFm Rhythms in Human Growth (e.g.; ears grow in 7-year cycle) [BHF27]

BHFn Curious Evolution of Lactose Intolerance (Or, just as logically, the widespread tolerance for the milk of other mammals.)

BHFo Sex Is More Pleasurable in Low-Oxygen Environments (e.g.; in aircraft) (There

seems to be no scientific research on this subject!)

BHFp Ability to Accurately Time the End of Sleep

BHFq Mothers Who Give Birth Later in Life Live Longer

BHFr Embryos Devloping outside the Womb (i.e.; even to birth)

BHFs Babies That Cry in the Womb

BHFt Too Much Sleep Shortens Life

BHFu Existence of a Universal Resting Metabolic Rate (i.e.; including humans, fish, trees, etc.)

BHFv Twin Frequency Is Inherited from the Father (It has been long supposed to be an "egg" phenomenon.)

BHFw Human Sperm Wars (i.e.; sperm competition)
w.1 Kamikazi Sperm
w.2 Sabotaging Sperm
w.3 Male Reproductive System Evolves New Offenses and Defenses (Sperm evolve---like autonomous life forms ---something like "selfish DNA!)

BHFx Embryo Genomes Actively Resist the Influences (Imprintings) of Paternal Genes (Why?)

BHFy Mysterious Origin of the Placenta (Claims that viral genes may have been involved.) [BHXa]

BHFz Why Did Morning Sickness during Pregnancy Evolve? (Equivalently, why has it not been eliminated by natural selection? Does it serve an unrecognized purpose?)

BHFaa Female Eggs Somehow Evaluate and Select Sperm (Their criteria are uncertain.)

BHFab Curious Dispositions of Unborn Twin Fetuses (Some end up as tiny skeletons in the placentas.)

BHFac Male Lactation (Occurs rarely, usually after a child is born.) [BMF12]

BHG HUMAN GENETICS

BHG1 Human Chromosomes Less Evolved Than Ape Chromosomes (Assertion based upon less variation in chromosomes. Implies humans evolved later.) [BHG12, BHGi]

BHG2 The Presence of Many Introns or "Nonsense DNA" in Human Chromosomes [BHGl] (Birds, however, have very few.) (BBG4, BHGl]]

BHG3 Human Chromosomes Lack the So-Called "Baboon Marker" (This is present in all non-human primates. Why wasn't it inherited, since human and ape genomes are so similar?)

BHG4 Y-Chromosome Analysis Suggests First Humans Were Pygmies

BHG5 Human and Ape Chromosome Numbers Differ (i.e.; 46 vs. 48, despite the 99%± match with chimp DNAs) [BHG11]

BHG6 Identical Twins May Have Different Genomes (i.e.; mutations can occur after egg has split)

BHG7 Gene Imprinting: Parental Influence on Corresponding Genes [BHFx]
7.1 A Gene from One Parent May Be "Deactivated" (The paternal genes usually.)
7.2 Female Selects Genes Leading to Smaller Embryo (How?)

BHG8 The Accentuation of Inherited Traits in Succeeding Generations (Some inherited diseases become worse with each generation. One would expect immune system to improve or the afflicted to be eliminated by natural selection.)

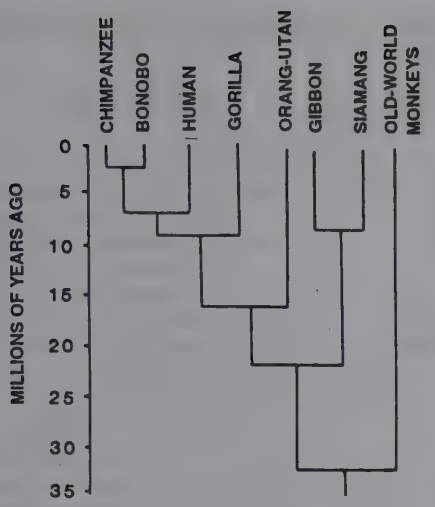
BHG9 Higher Variability of Mitochondrial DNA in Subsaharan Africans (i.e.; a more ancient origin is implied) [BHG15]

BHG10 Mitochondrial DNA Evolves Much Faster Than Nuclear DNA (i.e.; 5-10 times faster)

BHG11 Disparity between Human and Chimpanzee Phenotypes and Genotypes (Large morphological differences prevail, but only very small genetic differences are seen.) [BHG5

BHG12 Chimpanzee Mitochondrial DNA More Diverse Than That of Humans (Greater age of the species is impled.) [BHG1]

BHG13 Human Mitochondria Radically Different from Those of Other Organisms (Statement



The hominid family tree as determined by mtDNA analysis. [BHG11]

applies to ribosomal RNA genes.)

BHG14 Paternal Mitochondrial DNA Can Be Inherited
- 14.1 Some Survives in Embryo for Days or More
- 14.2 Egg Attempts to Destroy It
- 14.3 Its Existence Imperils African-Eve Theory Based upon mtDNA

BHG15 African Nuclear DNA Differs Markedly from That of Other Human Populations [BHG9]
- 15.1 PDHA Gene Sequence Different in Subsaharan Africans
- 15.2 Alu Deletion Variable in Subsaharan Africans but Constant Elsewhere

BHG16 Chromosome Banding Analysis Incompatible with DNA Analysis for Humans and Chimps (Different human-chimp phylogenies result.) [BHGj]

BHG17 Involucrin-Gene Analysis Conflicts with Mitochondrial DNA Analysis (A close human-chimp relationship is denied.)

BHG18 Human Molecular Clocks Run More Slowly Than Those of Apes (They were also slowed during hominid evolution--- and probably still are.)

BHG19 Absence of Transitional Forms of the protein Cytochrome C (A biochemical gap thus exists between the major classes of life.)

BHGa DNA and Speculations about the Origin of Modern Humans
- a.1 Nuclear DNA Suggests a Split between African and non-Africans about 156,000 Years Ago (Such age estimates vary as research progresses.)
- a.2 mtDNA Suggests an African Eve Existed ±100,000 Years ago (A theory now widely doubted!)
- a.3 Y-Chromosome Suggests an African Adam Existed
- a.4 Asia Y-Chromosomes Older Than African

BHGb Existence of High Deleterious-Mutation Rates in Hominids
- b.1 In Consequence, Hominids Should Now Be Extinct
- b.2 Further Evolutionary Advances Therefore Unlikely

BHGc Fetal DNA Circulates in Maternal Blood [BHC12, BHC15] (Some blood is exchanged across the placental interface.)

BHGd Existence of Epigenetic Factors in Evolution (e.g.; in gene methylation)

BHGe Possible Unique Lack of Native Retroviruses in Humans

BHGf Neanderthal DNA Suggests They Are Not Closely related to Modern Humans

BHGg DNA Tracking of Recent Human Global Dispersion Reveals Anomalies (See MABb.)

BHGh Persistence of Some Genes Despite Their Deleterious Effects (Why have such genes not been affected by natural selection?)
- h.1 Cystic Fibrosis Gene
- h.2 ITD Gene

BHGi Mutations of Human Nuclear DNA Far Fewer Than in Apes [BHG1, BHG12]

BHGj Banding Patterns on Human Chromosomes Differ Markedly from Those of Apes (Even though DNA is 99%± the same.) [BHG16]

BHGk Human Mutation Rates Very Low Compared to Other Mammals

BHGl Some "Junk" Genes ("Introns" Do Play Evolutionary Roles

in Humans [BHG2]
1.1 Alu Sequence
1.2 Microsatellites

BHGm Adult Human Corneas Often Having Missing or Extra Chromosomes (At birth the corneas are normal.)

BHGn "Fossil" Genes Related to HIV in Human DNA (Implies that hominids may have suffered HIV-like diseases before.)

BHGo X-Chromosome Sequence Different in Subsaharan Africans

BHGp mtDNA Sequences Often Inserted into Nuclear Genome

BHGq Male Y-Chromosome Wildly Different from Corresponding Female X-Chromosome
q.1 100 Times Fewer Genes
q.2 Unusual Amount of Junk DNA
q.3 Y-Chromosome Evolving More Rapidly
q.4 Although Essential to Human Fertility, It Is Degenerating and May Disappear.
q.5 Could Humans Become an All-Female Species (Like some fish and reptiles?)

BHGr So-Called "Pseudogenes" Exist That Do Not Code for Proteins Yet Have Important Biological Functions (In other words, genes are more than protein templates!)

BHGs Human Genome Much Smaller Than Anticipated and Is Surprisingly Similar to Those of Many Other Organisms

BHGt Differences in Organisms Depend Mainly upon How Genes Are Expressed (A higher level of control than the genome is implied.)

BHGu Women Select the More Vigorous of Their Two X-Chromosomes (This apparently leads to their longer lives? But how is this selection made?)

BHGv Unplumbed Role of "Jumping Genes" (Transposons) in Human Evolution

BHH HUMAN HEALTH ANOMALIES

BHH1 Health and Environmental Electricity
1.1 Density of Atmospheric Ions Correlated with Disease
1.2 Anecdotes of the Claimed Curative Effects of Lightning (e.g.; blindness)
1.3 Health Correlated with Geomagnetic Storms

BHH2 Health and Weather [BHB5]
2.1 Asthma Attacks Correlated with Thunderstorms
2.2 Physiological Effects of Storm-Generated Infrasound
2.3 Spread of Disease Correlated with Tornados and other Wind Storms [BHH5]
2.4 South American Malaria Epidemics Correlated with El Ninos

BHH3 Disease Epidemics Correlated with Solar Activity (e.g.; flu pandemics)

BHH4 Epileptic Seizures Correlated with the Full Moon [BHB4, BHHz]

BHH5 Disease Epidemics Correlated with Volcanic Eruptions (e.g.; Krakatoa dust and flu epidemic) [BHH2]

BHH6 Anomalous Periodicities in Disease Epidemics (e.g.; flu, measles, pertussis, etc.) (Periodicities suggest astronomical influences, as long suggested by F. Hoyle.)

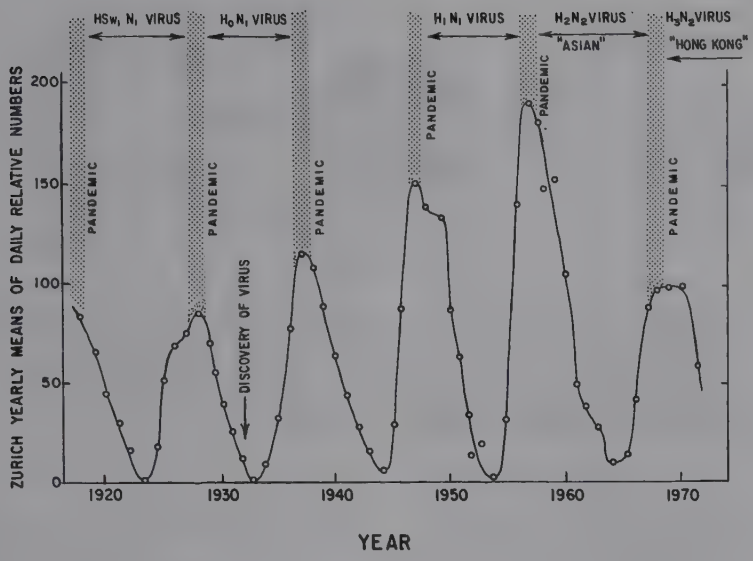
BHH7 Anomalous Appearance and Propagation of Disease [BHH6]
7.1 Nearly Simultaneous Appearance over Wide Areas
7.2 Rapid Propagation Where Person-to-Person Contact Is Rare
7.3 Existence of Disease-Free Areas during Pandemics

BHH8 Epilepsy and Rhythmic Phenomena [BHB7, PBHa]

BHH9 Health-Problem Synchronicities in Far-Separated Identical Twins (e.g.; sarcoidosis) [BHF35]

BHH10 Extreme Longevity
10.1 Remarkable Case Histories
10.2 Geographical Enclaves of Extreme Longevity

BHH11 Historical Changes in Average Longevity (A large increase



Hope-Simpson's comparison of flu outbreaks with the sunspot cycle. (Nature, 275:86, 1978.) [BHH3]

seems to have occurred with the appearance of Cro-Magnons in Europe, circa 40,000 B.P.) [BHA2, BHB14]

BHH12 Longevity Correlated with Brain Size in Hominid Evolution (Neanderthals are exceptions)

BHH13 Claim That Longevity Is Correlated with Hand's Lifeline Length: Supporting Data

BHH14 AIDS without Measurable HIV Antibodies

BHH15 HIV-Infected Persons Who Do Not Develop AIDS (i.e.; a long latency period) [BHH18]

BHH16 Anomalously Small Fractions of HIV-Infected T-Cells in AIDS

BHH17 Anomalous Levels of HIV Antibodies in AIDS

BHH18 Deliberately HIV-Infected Simians and Accidentally HIV-Infected Humans Who Do Not Develop AIDS

BHH19 HIV-1 and HIV-2 Are Far-Separated Genetically

BHH20 Anomalous Demographics of AIDS (e.g.; in U.S. 92% are males, Africa 50%)

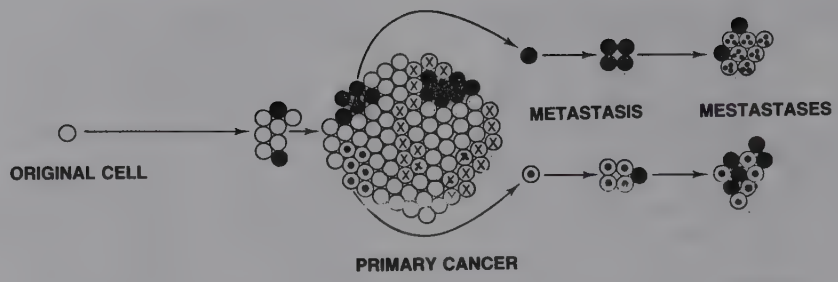
BHH21 Possible Cofactors in AIDS (Presented by scientists who suspect that the HIV virus is not the sole cause of AIDS.)
- 21.1 Micoplasmas
- 21.2 Herpes
- 21.3 Syphilis
- 21.4 Drug Use

BHH22 HIV-AIDS and Gaia (The correlation of AIDS with overpopulation and destruction of the environment. In Gaia-thought, the earth-as-an-organism is responding to the human threat with HIV.) [BHX16]

BHH23 Apparent Immortality of Cancer Cells

BHH24 Subversive and Suicidal Properties of Cancer Cells [BHH25, BHHe]
- 24.1 Angiogenesis (i.e.; subversion and harnessing of body functions)
- 24.2 Development of Resistance to Drugs
- 24.3 Production of "Progeny" (i.e.; metastases)
- 24.4 Heterogeneity of Cancer Metastases (A "shotgun" approach to colonize the body?)

BHH25 'Insidious" Properties of Cancer Metastases [BHH24]
- 25.1 Ability to Forcibly Enter Blood and Lymph Systems
- 25.2 Immune-System Evasion



Cancer usually commences with a tumor begun by a single cell (open circle). Some of the cells in the primary tumor (coded circles) are transformed and released during metastasis. (Scientific American, 259:60, November 1988.) [BHH25]

during Journeys

BHH26 Spontaneous Cancer Regressions without Medical Intervention

BHH27 Abnormal Bodily Electrical Potential Differences Correlated with Cancerous or Precancerous Conditions

BHH28 Cancer Correlated with Date of Birth (Winter-born individuals are more susceptible.)

BHH29 Cancer Incidence Correlated with Appendix Removal

BHH30 Cancer Remissions and Cures Correlated with Severe Infections (The story of Coley's toxins.) [BHHaf]

BHH31 Anomalous Effect of Radon Exposure on Lung-Cancer Incidence (It is an anticorrelation.)

BHH32 Father's Radiation Exposure Increases Cancer Incidence in His Children

BHH33 Atavistic Nature of Cancer (Cancer cells possess unspecialized, "primitive" characteristics.)

BHH34 The Ubiquity of Proto-Oncogenes (Why have they not been eliminated by natural selection?)

BHH35 Cancer Incidence Correlated with Organism Complexity ("Higher" forms of life are more cancer-prone. Is this only because they are more complex?)

BHH36 Survival of Inherited Human Diseases Despite Natural Selection

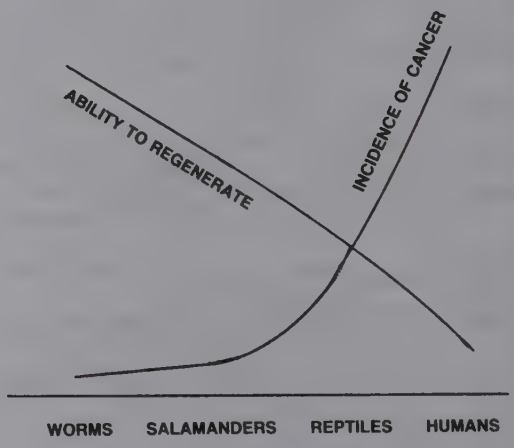
BHH37 Survival of Human Viral and Bacterial Diseases (Despite millions of years of evolution of new human defenses and the action of natural selection. Can any organism win in the wars of evolution?)

BHHa Anomalous Survival of Human Motion Sickness

BHHb Origin and Current Increasing Incidence of Asthma

BHHc Scientific Experiments Suggesting a Limited Efficacy of Homeopathy

BHHd Pregnancy Reduces Malaria Defenses (How and why?)



As the complexity of an organism increases, its ability to regenerate tissue decreases and its susceptibility to cancer increases. (New Scientist, 99:766, 1983.) [BHH35]

BHHe Cancer Utilization of the Extracellular Matrix (i.e.; the cell's microenvironment) [BHH24]

BHHf Autism Correlated with Season of Birth (i.e.; March-August most likely)

BHHg Anecdotes of Electrical Shocks Defeating the Bites of Poisonous Snakes

BHHh Organ Transplants Also Transfer Allergies

BHHi Chronic Diseases without Known Infectious Roots
- i.1 Schizophrenia
- i.2 Alzheimer's
- i.3 Multiple Sclerosis
- i.4 Cancer

BHHj Medical Advantages of Blood-Letting (Modern use of leeches.)

BHHk Proofs of the Efficacy of Acupuncture

BHHl Health Correlated with Psychological Disturbances (i.e.; partner's death, etc.)

BHHm Possibility That AIDS May Be Associated with Survival the of Bubonic Plague

BHHn Demographics of Incidence of Stroke (i.e.; more common in southeastern U.S.)

BHHo Longevity Anticorrelated with Reproductive Success

BHHp Controversy over Human Role in the Origin of the AIDS Epidemic (i.e.; experiments with early polio vaccines)

BHHq Mysterious Demise of The Lousy Disease (i.e.; phthiriasis)

BHHr Hair Structure Correlated with Incidence of Cancer

BHHs Babies' Colic as an Adaptation to Weed Out Impatient Parents from the Gene Pool (Tongue-in-cheek?)

BHHt "Selfish" Chromosomes as a Cause of Down's Symdrome (They seem to force themselves into cells.)

BHHu Vampirism Consistent with Symptoms of Rabies

BHHv When Diabetes Had Survival Value (e.g.; recently on Nauru Island)

BHHw Longevity Correlated with Season of Birth (autumn is favored)

BHHx Mental Health Anticorrelated with Geomagnetic Activity

BHHy Mental Health Correlated with Season of Birth (e.g.; schizophrenia with winter births)

BHHz Mental Disorders ("Lunacy") Correlated with Exposure to Moonlight [BHB4, BHH4]

BHHaa Death Rate for Babies Born at Night Double that for Day

BHHab Longevity Correlated with High IQ

BHHac People Immune to Malaria (Plasmodium) Are Immune to All Four Species (This is difficult to explain by known immune-system mechanisms.)

BHHad Wounds Heal Very Poorly in Zero-G [BHF11]

BHHae People Exposed to More Infections Have Less Asthma

BHHaf Some Resistance to AIDS Provided by Exposure to Other Diseases [BHH30]
- af.1 Small Pox
- af.2 Scrub Typhus

BHI INTERNAL SYSTEMS AND STRUCTURES OF HUMANS

BHI1 High Complexity and Sophistication of the Immune System [BHIf]

BHI2 The Origin of the Incredible Diversity of Human Antibodies (It is speculated that a 100 million different antibodies may be possible. Such a large number strongly supports BHI1. Even a Darwinist must ask whether random mutations can produce such a versatile system. He or she is, of course, restricted to a "yes" answer!)

BHI3 Human Immune-System Deficiencies
- 3.1 Hypersensitivity to and Aggressiveness against the Body's Own Tissues
- 3.2 Slowness in Responding to Novel Antigens (i.e.; new bacteria and viruses)

BHI4 The Enigma of the Fetal Graft (The female immune system's tolerance of foreign tissue.) [BHF20]

BHI5 The Unplumbed Relationship between the Immune System and the Brain (Emotional states can affect immune-

system performance.) [PPIa]

BHI6 Phantom-Limb Phenomena
- 6.1 Apparent Reality of a Wide Range of Physiological Sensations (Touch, heat, pain, etc. are perceived despite severence of nerves.) [BHI7]
- 6.2 Apparent Dynamic Reality (The phantom limb feels normal while walking with an artificial limb.)
- 6.3 Continuation of Pre-Amputation Sensations (i.e.; feel of a finger-ring)
- 6.4 Non-amputees Who Have Nerve Damage Experience Similar Sensations
- 6.5 Children Born without Limbs Experience the Same Phenomena
- 6.6 Amputation Causes Cortical Reorganization
- 6.7 Virtual ("Missing") Limbs May Be Felt to Exist Elsewhere on the Body (Evidently, there is "cross-talk" in the brain and nervous system.)
- 6.8 Brain May be Trained to Suppress Phantom-Limb Sensations (Mirror images of the surviving limb are employed.)

BHI7 The Puzzles of Pain
- 7.1 Lack of Sense of Pain in Some Otherwise Normal People
- 7.2 Delayed Pain (i.e.; in battlefield wounds)
- 7.3 Psychogenic Pain (i.e.; no apparent physiological cause)
- 7.4 Efficacy of Placebos in controlling pain
- 7.5 Efficacy of Acupuncture
- 7.6 Efficacy of Hypnosis
- 7.7 Referred Pain (Why is pain sometimes felt at places where cause is absent? Just naming the phenomenon does not explain it.)
- 7.8 Phantom-Limb Pain [See BHI6]
- 7.9 Claimed Efficacy of Magnetism in Reducing Pain
- 7.10 Pain May Not be Felt during Mental Exaltation (e.g.; during battles and martyrdom) (Note that this is the opposite of psychogenic pain.)

BHI8 Surprising Differences between the Structures of the Aorta Arch in Humans and Other Mammals, Including Primates

BHI9 The Varying Origin of Arms and Legs in the Embryos of Closely Related Species (This phenomenon is also seen in other body structures and organs.)

BHI10 Skeletal Similarities between Mature Humans and Embryonic and Juvenile Apes (This is an important aspect of human neoteny.) [BHA10]

BHI11 The Inheritance of Skeletal Characteristics Acquired by a Parent during Life (e.g.; bone adaptations to sitting, squatting) (This is another phenomenon advanced by Lamarckians.)

BHI12 Bone-Shedders (i.e.; claims of loss and replacement of finger bones) (No modern medical cases found.)

BHI13 High Incidence of Extra Vertebrae among Eskimo Men

BHI14 Human Subcutaneous Fat in Quantities Comparable to Those in Marine Mammals (This fat layer is negligible in other primates. A plus for the Aquatic Ape hypothesis!) [BHF11, BMI3]

BHI15 Presence of Magnetite in Human Tissues (Such particles might be employed for navigational purposes. In humans, they occur in the sinuses and brain.) [BHT18]

BHIa Human Circadian Clock Claimed to Be Reset by Light Shone on Knees (This phenomenon has not been replicated and may not exist.)

BHIb Construction of Human Neural Network and Multitudinous Interconnections Guided by Special Proteins (But what is the source of these proteins and the map they use?)

BHIc Unknown Genetic Origin of Asymmetry of Internal Organs (which are rarely reversed, situs inversus") [BHA1]

BHId Males Accept Donated Female Organs But Not Vice Versa (No reason advanced.)

BHIe Immune System Primed at Birth (In other words, some immunity is inherited. Is the genome the source of this

gigantic store of information?) [BHI1]

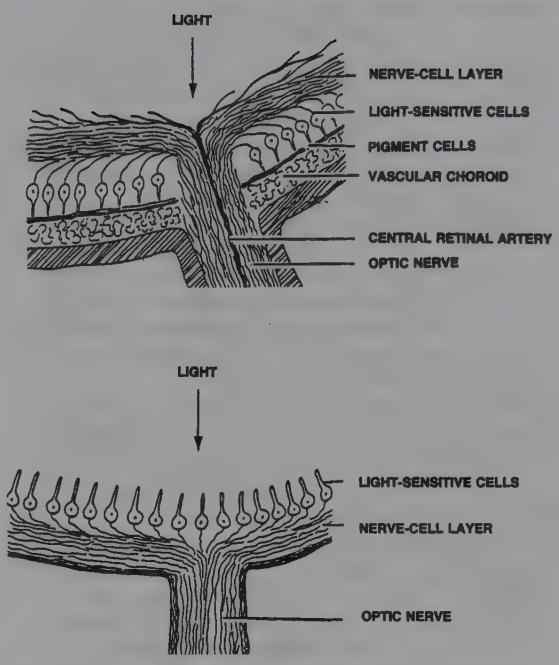
BHIf Claim That Knee Joint Is "Irreducibly Complex" (It possesses 16 critical characteristics, each requiring immense information storage space in the genome. Some claim that "Intelligent Design" is implied. The same could be said for the vertebrate eye and many other biological structures.) [BHO1]

BHIg Bones Do not Form Normally in Zero-G [BHHad]

BHIh Unknown Nature of Information Transmitted along Nerves (What formats, conventions, etc.?)

BHIi Origin and Purpose of Multisensory Neurons (i.e.; those that can be triggered by many senses simultneously) (How are signals from the various sources separated and rerouted?)

BHIj Claim That Body Is Controlled by Myriad of Distributed Quantum Computers (Implying that not all computation occurs in the brain.) [BHOq]



The inefficient, inverted vertebrate retina (top) compared with the invertebrate retina (bottom). (Creation Research Society Quarterly, 22:62, 1987.) [BHO3]

BHO HUMAN ORGANS

BHO1 High Complexity and Sophistication of the Human Eye [BHIf]

BHO2 Dearth of "Fit" Intermediate Stages in the Evolution of the Eye (Basically, this is a claim of "irreducible complexity," which to some implies "Intelligent Design.")

BHO3 Design Imperfections of the Human Eye
- 3.1 "Reversed" Retina (Rods and cones do not face the incoming light directly.)
- 3.2 Presence of the Blind Spot
- 3.3 Chromatic Aberration
- 3.4 The "Cartenoid Imperative" (Animals cannot synthesize this chemical and must obtain it from plant products.)

BHO4 Vision-Chemistry Homologies (The essential identity of chemicals in visual pigments in all eyed animals despite great evolutionary divergence.)

BHO5 The Anomalous History of Human Color Vision (The apparent loss and recovery of trichromatic vision. Of course, the fossil record cannot demonstrate this; it is a surmise. Most other mammals are bichromatic today. Birds, however, boast five visual pigments.) [BMOa]

BHO6 Utility of the Semi-Lunar Membrane of the Human Eye (It is not vestigial as often claimed.)

BHO7 Similarity of Human and Cephalopod Eyes (e.g.; general geometry, lenses, corneas, rod pigments, etc.) (Interesting because of the wide evolutionary gaps between invertebrates and vertebrates.)

BHO8 Similarity of Human and Bee Eyes in Color-Vision Capabilities (Except for the bees' ability to see into the ultraviolet.)

BHO9 The Unknown Purpose of the Emission of Sound by the Human Ear [BMC4]

BHO10 Human Lobulated Kidneys and Indented Spleens (These organs are similar to those of marine mammals but not the other primates. Used to support the Aquatic Ape hypothesis.)

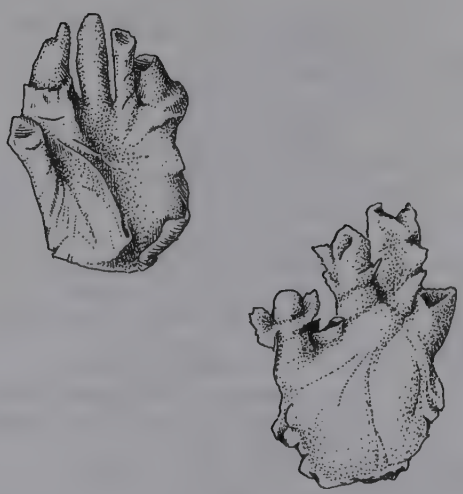
BHO11 Correlation of Pineal Gland Activity with Geomagnetic Field Variations (Melatonin production is increased in high fields. Is there a purpose behind this phenomenon?)

BHO12 Heart Rate Correlated with Birth Order (Early-borns have shorter cycles.)

BHO13 A Curious Periodicity in Deaths Due to Heart Disease (A 9-2/3-year cycle is claimed.)

BHO14 Lifetime Total of Human Heartbeats Is Triple Those of Other Mammals [BHF4]

BHO15 Skin Shedding (The rare exfoliation of large sheets, often annually.)



Remarkable skin-shedding from human hands. (Scientific American, 83:100, 1900.) [BHO15]

BHO16 Thick Soles on the Feet of Infants (Used as an example of Lamarckism; i.e., an inherited adaptation.) [BMA18]

BHO17 Data Supporting the Claim That Brain Size Is Correlated with Intelligence (A correlation generally rejected.)

BHO18 The Sudden Large Increase in the Size of the Hominid Brain in the Last 3 Million Years [BHE2]

BHO19 Morphological Differences between Normal Human Brains
19.1 Sexual Dimorphism (Males about 15% larger.)
19.2 Right-Handers and Left-Handers [BHO1]

BHO20 Remarkable Capabilities of Badly Damaged Human Brains

BHO21 The Origin and Meaning of Electrical Brain Waves

BHO22 Capabilities of the Human Brain Greatly Exceed Requirements for Survival (e.g.; in music, mathematics)

BHO23 The Experimental Lack of Memory Traces (Engrams) [BHOn]

BHO24 High Complexity and Sophistication of the Human Brain (Many of the scientific and engineering principles involved in brain functions are beyond our present knowledge.)

BHOa Musical Ability and Perfect Pitch Associated with Left Hemisphere of the Brain

BHOb Some Clinically Blind People Can Sense Objects in Rapid Motion (Physiological mechanism unknown.)

BHOc "Heart Music" Derived from Varying Heartbeat Intervals (Curious, but significance, if any, not obvious.)

BHOd Wide White Area around Iris (the Sclera) Unique in Humans

BHOe Severance of the Corpus Callosum Is Not Severely Disabling (So-called "split-brain" people are only mildly handicapped.)

BHOf Information-Transfer Phenomena in Eye-Brain System
f.1 Neural Synchronization implies Collective (Holographic?) Operations

f.2 Information is Encoded in Pulse Timing
f.3 Each Neuron Can Receive Inputs from 10,000 or More Other Neurons (How are so many pulse-timed inputs processed by biochemical mechanisms.)

BHOg Many Anecdotes Describing "Miraculous" Recoveries of Sight [BHH1]
BHOh People with Two Working Hearts
BHOi Formation of New Neurons in Brain (Contrary to long-held opinions.)
BHOj Various, Different Explanations of the "Moon Illusion"
BHOk "Simultanagnosia": the Inability to Deal with More than One Object or Concept at a Time
BHOl Lefties Possess Larger Corpus Callosums [BHO19]
BHOm Gender Differences in Information Processing (Women process words on both sides of the brain. Men prefer one side or the other.)
BHOn Mystery of How Information Is Encoded in the Brain (It it seems to be holistic in nature---somewhat "spooky.") [BHO23]
BHOo Claim that Human Brain Growth Was Stimulated Historically by Eating Cooked Tubers (A rationale actually exists!)
BHOp Dendrites (Fine Ends of Neurons) Actually Move and Multiply
BHOq Eye Motor Neurons Engage In Information Processing Prior to Sending It to the Brain [BHIj]
BHOr Sign Language Processed in Auditory Cortex
BHOs Motion of Objects Is Processed by Special, Curiously Shaped Brain Cells
BHOt The "Seeing Ear" (Some claim that light is conducted through ear to pineal gland.)
BHOu Embryo's Olfactory Receptors Help Guide Embryonic Development
BHOv Cerebrospinal Fluid Also Transfers Information to Brain
BHOw Appendix Not a Vestigial Organ (e.g.; it produces antibodies)
BHOx Nostril Cycling (i.e.; nostrils have different sensitivities, air flow changed every few hours) [BHF3]
BHOz Different Part of Brain Used for Learned Language (One's native language is processed elsewhere.)
BHOaa Apparent Overdevelopment of the Brain in Contrast to Generally Primitive Features Elsewhere (Humans are neotonous in their many juvenile features.) [BHA10]
BHOab Human Hermaphrodites (i.e.; genitals are half male, half female) (They are terata rather than anomalies.)
BHOac Human and Chimp Brains Differ in Size and Capabilities Due Mainly to Gene Expression (What determines these large differences in expression?)
BHOad Hearing Implants Also Improve Vision
BHOae Claim that Brain is Hard-Wired to Accept Religion (Hard to prove, this condition may also apply to science!)
BHOaf Eye Crystallin Differs among Species (i.e.; suggesting eyes evolved many times)
BHOag Brain Responds Strangely to Laboratory Magnetic Fields (e.g.; loss of speech)
BHOah Ear's Hair Cells Amplify Sound in Unknown Way
BHOai Existence of Motion-Induced Blindness
BHOaj Infant Brain Hard-Wired to Process Music (This may be linked to our ability to use language, which evolutionists accept as a useful trait. Can the same be said for music?)

BHT UNUSUAL HUMAN SENSES AND FACULTIES

BHT1 Telescopic Vision (i.e.; the ability to see and identify objects at greater distances than normal people)
1.1 Seeing Jupiter's Galilean Satellites with the Naked Eyes
1.2 Ditto Martian Craters
1.3 Daytime Observations of Venus
1.4 Ships Still Over-the-Horizon (So-called "Nauscopy")
BHT2 Moonblindness (Many very old

anecdotes.)

BHT3 Blindsight (i.e.; some blind people can detect and identify some things without forming visual images) [BHT10, PHDm]

BHT4 A TV-Snow Visual Phenomenon (Different patterns appear when screen is viewed monocularly and binocularly.)

BHT5 Possible Color-Vision Deficiency of Ancient Peoples (The apparent inability of ancient Greeks and other peoples to distinguish some colors, as indicated by their surviving literature.)

BHT6 Color Sensitivity Correlated with Lunar Phase (Curiously, it peaks at full moons. Whatever could be behind this?)

BHT7 Anomalies in the Evolution of Color Vision [BHO5]
- 7.1 The Postulated Mammalian Loss of Some Color Vision during Evolution, Including Ultraviolet Sensitivity
- 7.2 The Apparently Recent Human Recovery of Trichromancy (e.g.; most mammals remain dichromatic)

BHT8 Dermo-Optical Perception (Claims of light, color, and/or image perception by the human skin.) [PHDf]

BHT9 Visual Phenomena Caused by the Passage of High-Energy Particles through the Eyes of Astronauts

BHT10 Facial Vision: In Effect, Human Echo-Ranging [BHT3]

BHT11 Our Sound-Suppression Faculty (The valuable ability to "tune out" extraneous sounds.)

BHT12 Electromagnetic Radiation Perceived as Sound ("Electrophonic" sensations from radar, high-altitude meteors, and energetic auroras.) [GSH2, GSH3]

BHT13 Hearing under Anesthesia [BHFd]

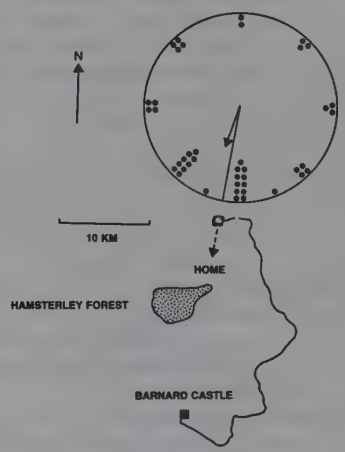
BHT14 Variability and Sophistication of Human Tone Perception (e.g.; "perfect pitch.")

BHT15 Anomalous Communication in Children
- 15.1 Hand Babbling
- 15.2 Private Language of Identical Twins

BHT16 Discontinuity in the Evolution of Communication (The great gap between humans and other primates and, we suppose, the cetacea.)

BHT17 The Ability to Sense Magnetic Fields (They are usually rendered as visual effects.)

BHT18 Human-Navigation Senses [BHI15, BMT2]
- 18.1 The Ability to Point Out Compass Directions without Other Cues
- 18.2 The Ability to Point Out the Direction of Home or Other Fixed Point



Barnard Castle (England) homing experiments. Blindfolded and earmuffed subjects were taken from "home" to the Castle by the devious route shown. The dots in the circle represent their estimates of the direction of "home." (New Scientist, 87:844, 1980.) [BHT18]

BHT19 Exposure to Low-Frequency Electromagnetic Field Lengthens One's Reaction Time

BHT20 Human Drowning Proneness (However, see BHTe.)

BHT21 Human Diving Reflex Unique among Primates (The reduction of blood supply to most of the body upon immersion of the face. Another argument for the Aquatic Ape hypothesis.)

BHT22 The Paradoxes of Consciousness [PIK]
- 22.1 The Evolutionary Paradox

(The apparent existence of survival value but no physical basis for evolution to work with.)
22.2 The Logical Paradox (The lack of a physical basis for consciousness also denies reductionists the basis of their reasoning power!)

BHT23 Anomalous Skin Adhesive Power
BHT24 Chicken-Sexing Faculty (Success in the absence of any obvious physiological cues from the chickens!)
BHT25 The Ability to Perceive Established But Hidden Information (The ability to detect and interpret cryptic images understood by others; in "remote viewing, for example.) [PHDg]
BHTa Claimed Perception of Human Auras [BHA24]
BHTb Detection of Earthquake Precursors (This ability has been seen in brain scans prior to quakes.) [BHQb]
BHTc Unconscious Communication via Pheromones [BHF15]
BHTd Inability of Most People to Write Better Music than Computers (A supposed subjective, very-human ability.)
BHTe Human Long-Distance Swimming Ability Compared to Other Great Apes [BHT20]
BHTf Native Language Becomes Familiar in the Womb (This is supposedly seen in the responses of infants.)
BHTg Throat-Singing (i.e.; also called "overtone singing")
BHTh Ability to Tolerate Very High Temperatures (e.g.; 105°C for 15 minutes)
BHTi Fire-Walking Feats (Many can, but some fail painfully.)

BHU UNRECOGNIZED LIVING HOMINIDS

BHU1 North American Hominids (i.e.; Bigfoot/Sasquatch)
BHU2 Giant Arctic Hominids (i.e.; the Tormit)
BHU3 Past Presence of American Pygmies (The Maya of Central America were probably the shortest people in the world and classified by some as "pygmoid.") [MSB2, MSE3]
BHU4 Hairy "Submen" in South America (i.e.; the Maricoxis)
BHU5 The Almasti: Asian Subhumans?
BHU6 The Chuchunaa of Siberia
BHU7 The Yeti or "Abominable Snowman"
BHU8 The Yeren or Chinese Wildmen
BHU9 The Nittaewo: Sri Lanka Dwarf Hominids?
BHU10 The Orang Pendek or Sedapa of Sumatra
BHU11 Australia's Yowie or Yahoo
BHU12 The Agogwe: Africa's Little Furry Men
BHU13 Hominid Corpses of Unknown Provenance (i.e.; the Minnesota Iceman)

BHX HUMAN INTERFACE PHENOMENA

BHX1 Anomalous Communications Interfaces
1.1 With Other Animals
1.2 With Plants and Microbes
1.3 With Extraterrestrial Life
BHX2 Unusual Human-Animal Psychological Interfaces
2.1 Induced Psychosis
2.2 Animal Hypnotism [BRXa]
2.3 The Effects of Human Music on Other Life Forms
2.4 The Effect of Human Handling of Animals
2.5 Similarity of Human and Humpback-Whale Music
BHX3 Unusual Animal Succoring of Humans
3.1 Feral Children
3.2 Dolphin Rescues
BHX4 Human Psychic Healing of Other Animals
BHX5 Human-Animal Cooperation and Symbiosis
5.1 In Fishing, with Dolphins [BMB29]
5.2 With Honeyguides [BBB1, BBX4]
5.3 Healthful Effects of Tapeworms
BHX6 The Human-Endosymbiont Interface (Human cells contain mitochondria and other organelles. It has been speculated that both viruses and bacteria played major roles in the evolution of life.)

Distribution of some claimed, living Eurasian hominids. (Antiquity, 56:31, 1982.) [BHU5]

BHX7 Animal Sexual Assaults on Humans (e.g.; gorillas, dolphins, baboons)

BHX8 Other Unusual, Apparently un-Provoked Animal Attacks on Humans (e.g.; water buffalos, cassowaries)

BHX9 The Human-Wasp Interface (The old belief that wasps will not sting if one holds one's breath.)

BHX10 Yellow-Fever Mosquitoes Favor Humans with Blood Type O

BHX11 The Anomalous Distribution of Human Lice (i.e.; same genus on New World monkeys, but not on Old World anthropoids)

BHX12 A Bizarre Human-Fish Phenomenon (A slim South American catfish invades the human urogenital tract.) [BFXa]

BHX13 The Inverse Relationship between the Presence of Human Parasites and the Incidence of Allergies

BHX14 Manipulation of Human Behavior by Viruses (i.e.; as in rabies)

BHX15 "Ultimate" Parasites of Humans (i.e.; "selfish" genes or "selfish" DNA)

BHX16 The Human-Gaia Interface (Evidence we are being manipulated by Gaia.) [BHH22]

BHX17 Human Degeneracy and the Man-Machine Interface

BHXa Ancient Virus Invaders May Have Played a Role in the Origin and Evolution of the Mammalian Placenta [BHFy]

BHXb The Intimate Human-Bacteria Interface (200-500 species in the mouth alone)

BHXc Claim That the Emanations of Some Plants Cause Sleep

BM OTHER MAMMALS[16,17]

BMA	EXTERNAL APPEARANCE AND MORPHOLOGY
BMB	UNUSUAL MAMMALIAN BEHAVIOR
BMC	MAMMALIAN CHEMICAL AND PHYSICAL PHENOMENA
BMD	DISTRIBUTION OF MAMMALS IN SPACE AND TIME
BME	THE FOSSIL RECORD OF MAMMALS
BMF	BODILY FUNCTIONS OF MAMMALS
BMG	MAMMALIAN GENETICS
BMI	INTERNAL SYSTEMS AND STRUCTURES
BMO	MAMMALIAN ORGANS
BMT	UNUSUAL FACULTIES AND TALENTS OF MAMMALS
BMU	UNRECOGNIZED MAMMALS
BMX	MAMMALIAN INTERFACE PHENOMENA

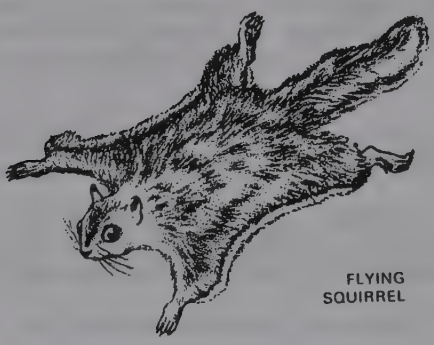
About 5,000 mammalian species are now living, and they are amazingly diverse. They have conquered the air and the depths of the ocean. Some are fossorial experts and spend their lives underground. The physiological differences between a microbat and a sperm whale are profound in many ways. Some mammals are carnivorous loners, like the wolverines; others like the eusocial naked mole rats, live in tightly controlled groups.

Anomalies and fascinating curiosities aplenty make up this extraordinary group of animals. Here are some of the highlights from the long lists in the main text.

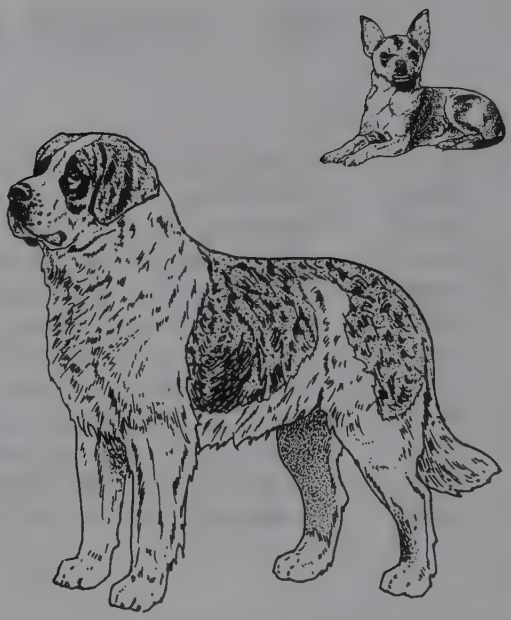
- Radical distortions of nominal mammalian physiology; i.e.; the toothed whales.
- The existence of specially developed "dispersive morphs" in the naked mole rats.
- The development of many gliders and, of course, the micro- and megabats which are true fliers.
- The development of sound-generating and detecting organs for navigation, hunting, killing, and communication.
- The mammalian synthesis of poisons, though these are weak compared to those of the reptiles and cone shells.
- The strange utilization of unnucleated red-blood cells in comparison to those of birds and reptiles.
- Mammals in anomalous places; e.g.; the Lake Baikal seals.
- The still-unexplained widespread extinction of large mammals about 10,000 years ago.
- The existence of mammals exhibiting perpetual growth (beavers and red kangaroos, for example).
- The inheritance of the effects of adaptations to continuous rotation and cold---both acquired characteristics á la Lamarck and supposedly forbidden.
- The existence of tropical mammals with thick layers of subcutaneous fat.
- The development of electrosensitivity, as in the star-nosed moles and the platypuses.
- Unexplained navigational capabilities, as seen in homing experiments and long-range migration.
- Tool manufacture and use.
- Peculiar and unexplained capabilities as seen in the ability of dogs to sense approaching epileptic seizures in humans and the presence of cancers.

BMA EXTERNAL APPEARANCE AND MORPHOLOGY

BMA1 Remarkable Mammalian Morphological Parallelisms
1.1 Convergences (e.g.; marsupial flying phalangers and placental flying squirrels)
1.2 Mimicry (e.g. aardwolf and hyena, both placental mammals)



Flying phalangers are marsupials but their resemblance to placental flying squirrels is remarkable. (G.R. Taylor; The Great Evolution Mystery,, 1983.) [BMA1]



All domestic dogs, regardless of breed, are the same species. (D. Dewar; The Transformist Illusion, 1957.) [BMA2]

BMA2 Limits on the Variability of Domestic Animals (Humans have never been able to breed new species of domestic or laboratory animals. All dogs remain the same species.)

BMA3 Unusually Divergent Mammal Populations (e.g.; "resident" and "transient" orcas) (These may represent a splitting of the species.) [BMAf]

BMA4 Unusual Hybrids and Mosaics
4.1 Hybrids (e.g.; blue whales and humpbacks)
4.2 Mosaics (e.g.; duck-billed platypus)
4.3 Radical Deviants (e.g.; "Oliver," a chimp with astonishing human traits but chimp DNA) [BMGm]

BMA5 Dearth of Mirror-Image Twins in Nonhuman Mammals (But they are not rare in humans. [BHA9]

BMA6 Atavism and Reversion in Mammals (Dogs of all breeds that become feral eventually end up looking alike.)

BMA7 Neoteny in Nonhuman Mammals (e.g.; bonobos and dolphins) [BHA10]

BMA8 Albino Populations of Mammals (e.g.; claims of albino herds of musk oxen)

BMA9 Unusual Mammalian Sex Ratios (With spider monkeys, the offspring of low-ranking females are usually all female while high-ranking females produce mostly males!) [BHA

BMA10 Wolves Defy Bergmann's Law (Wolves are smaller at higher latitudes instead of vice versa.)

BMA11 Unusual Sexual Dimorphism in Mammal (Male Weddell seals are much smaller than the females.)

BMA12 Zebra Stripe Reversal (Zebras with black backgrounds instead of white. The zebra default color can be either black or white. No kidding!)

BMA13 The Incongruous Existence of Zebras with Vivid Stripes (Other animals of the plains are much less conspicuous to predators. Has natural selection failed to work?)

BMA14 Land-Mammal Hairlessness (Most marine mammals are almost totally hairless, but only a few land mammals, such as elephants and naked mole rats are hairless.) [BHA29]

BMA15 The Greening of Sloths (Sloths possess special, grooved hairs that harbor camouflaging green algae. An interesting mutualism.)

BMA16 Polar-Bear Hairs as Light Pipes for Solar Heat (This claim has been challenged.)

BMA17 Sudden Blanching of Mammal Hair (e.g.; due to fright, injury, or disease) [BHA31]

BMA18 Mammalian Callosities (i.e.; a potential example of Lamarcksim) (e.g.; camels) [BHO16]

BMA19 Skin Masks (e.g.; bats with translucent areas in their wings where the wings wrap around the faces)

BMA20 Extensive Scarification of the Skin (e.g.; Risso's dolphin) (The scars probably originate in fights, but they seem too numerous.)

BMA21 Microwave Emissions from Mammals (e.g.; claimed for rabbits)

BMA22 Bat Faces: Remarkably Varied and Bizarre (i.e.; thousands of different designs)

BMA23 Nictitating Membranes in Mammals (e.g.; all monotremes, beavers, rabbits) (A curious set of animals to possess this feature. Why not others if it is useful?)

BMA24 Eye Oddities among the Mammals (e.g.; susus' eyes lack crystalline lenses) (Susus are river dolphins.)

BMA25 The Inheritance of Eye Injuries (e.g.; old claim made for guinea pigs) (The inheritance of acquired characters was proclaimed.)

BMA26 Ear, Mouth, and Nose Valves in Nonaquatic Mammals (e.g.; camels, sloth bears) (For protection from flying sand and termites.)[BHA41]

BMA27 Grossly Displaced Nostrils (e.g.; the cetacea, elephants)

BMA28 Unexpected Functions of Noses and Nostrils (e.g.; sound emission in bats)

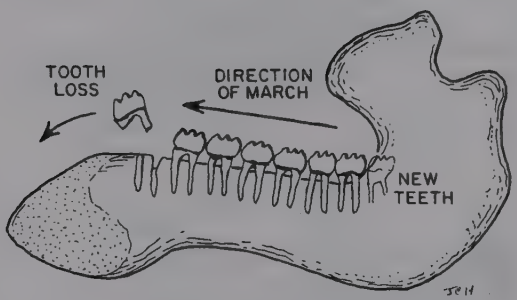
BMA29 Nasal Features with Unknown Functions (e.g.; tube-nosed bats)

The purpose if any, of the nasal tubes of the tube-nosed bats in unknown. (M.B. Fenton; Bats, 1992.) [BMA29]

BMA30 Curious Teeth and Dentitions
- 30.1 Hinged Teeth (e.g.; Chinese water deer)
- 30.2 Egg Teeth (e.g.; the monotremes)
- 30.3 Forward-Pointing Teeth (e.g.; Weddell seals)
- 30.4 Backward-Pointing Teeth (e.g.; infant bats; for hanging on to mother)
- 30.5 Scalpel-Like Teeth (e.g.; vampire bats)
- 30.6 Comb-Like Teeth (e.g.; crabeater seals for straining out food)
- 30.7 Tubule Teeth (These have no enamel and grow continuously.) (e.g.; aardvarks)

30.8 Normally Missing Teeth (e.g.; sloth bears, which vacuum up termites through the gap)
30.9 Asymmetrical Dentitions (e.g.; pigmy orcas, which have more teeth on bottom jaw)
30.10 Extra Teeth (e.g.; sea-otters' four lower incisors)

BMA31 Marching Teeth (i.e.; teeth that move forward to replace those falling out) (e.g.; elephants, manatees)



"Marching" teeth of the manatees---and also elephants, some pigs and marsupials. (R.M. Nowak; Walker's Mammals of the World, 1991. [BMA31]

BMA32 Microbats and Megabats Have Strikingly Different Dentitions (This suggests a distant relationship, but DNA analysis proves them to be monophyletic.)

BMA33 "Unperfection" in Strap-Toothed Whales (Males cannot open jaws more than 2 inches. How do they eat?)

BMA34 Questionable Utility of Some Mammalian Tusks (e.g.; dugongs)

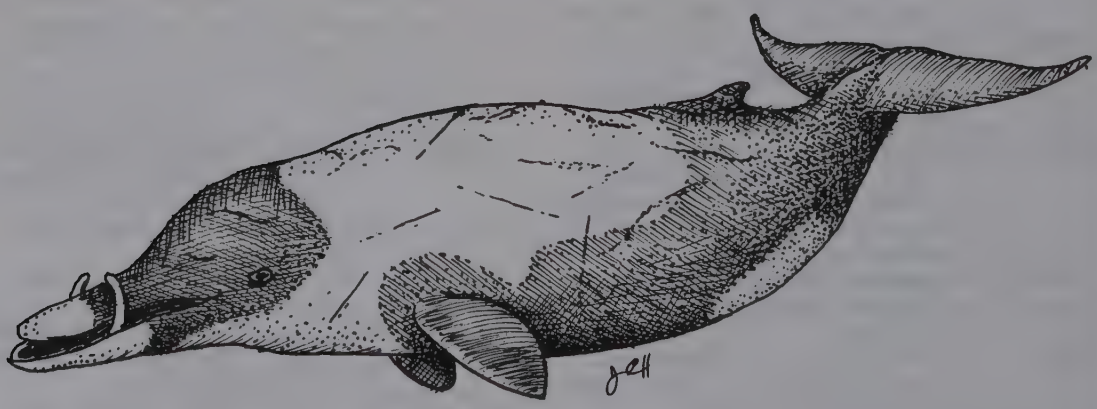
BMA35 Toothlessness in Mammals (e.g.; baleen whales; baleen origin hard-to-explain)

BMA36 Questionable Utility of Some Horns and Antlers (e.g.; unwieldy ibex horns)

BMA37 Horns Correlated with Toes and Stomachs (Paired horns occur only on even-toed mammals with four-chambered stomachs! A curiosity only.)

BMA38 Horn and Antler Curiosities (e,g,; four-horned antelopes, five-horned giraffes) [BHA46]

BMA39 Remarkable, Usually Paralleled, Innovations in Mammalian Extremities
39.1 Rotatable Hind Feet (e.g.; tree squirrels)
39.2 Reversed Feet (e.g.; bats
39.3 Extra Digits (e.g.; pandas



Adult male strap-toothed whales can barely open their jaws, yet they seem to capture all the food they require. (S. Leatherwood and R.R. Reeves; Whales and Dolphins, 1983. [BMA33]

for stripping bamboo food)
39.4 Greatly Lengthened Digits (e.g.; aye-ayes for fishing insects out of holes)
39.5 Suckered Feet (e.g.; some bats)
39.6 Stowable Wings (e.g.; some bats)

BMA40 Parallelisms in Mammalian Extremities
40.1 Nonaquatic Mammals with Webbed Feet (e.g.; elephants, which have been seen swimming miles from land)
40.2 Opposable Thumbs (e.g.; some possums and opossums)
40.3 Gliding Membranes (e.g.; phalangers, flying lemurs, flying squirrels)

BMA41 The Existence of Functional Wings on Mammals (another example of complexity and sophistication)

BMA42 Atavism in Mammalian Extremities (e.g.; hind legs on whales---rarely)

BMA43 Parallelisms and Lack Thereof in Prehensile Tails (Prehensile tails are widespread among distantly related animals, but often absent in closely related species.) (e.g.; monkeys and the great apes)

BMA44 Break-Off Tails (e.g.; many rodent families)

BMA45 Propulsive Tails
45.1 Normal Tails Modified for Propulsion (e.g.; beavers)
45.2 Specially developed fish-like tails (e.g.; the cetacea)

BMA46 Spotty Distribution of Mammalian Dorsal Fins (This innovative feature in marine mammals varies greatly.) (e.g.; finned bottlenose dolphins and finless dolphins)

BMA47 The Remarkably Long Neck of the Giraffe (Actually, the giraffe's neck has the same number of vertebrae as most other mammals.If better food access were the reason for the evolution of the long neck, the shorter females were short-changed!) [BMBa, BMIb]

BMA48 Curious Affinities in the Arrangements of Genitals
48.1 Scrotum in Front of Penis (e.g.; all marsupials and the placental lagomorphs---such as rabbits. Why should rabbits be different?)
48.2 Internal Testes (e.g.; elephants, moles and many marine mammals)

BMA49 Unusual Pouches on Mammals (e.g.; bat wing pouches)

The South American yapok is the only aquatic marsupial. The female has a watertight pouch for the young. (K.H. Redford and J.F. Eisenberg; Mammals of the Neotropics, 1992.) [BMA49]

BMA50 Poisonous Spurs on Mammals (e.g.; platypusses)

BMA51 Odor Convergence (e.g.; marsupial striped possum and placental striped skunk)

BMA52 Whole-Body Vibrations of Mammals (e.g.; some bats) [BHA56]

BMAa Aquatic Features of Fetal Elephants (These, along with many adult features, suggest an aquatic origin.)

BMAb Seal Whiskers Highly Sensitive to Water Motion

BMAc Whale Bony Beaks Are Sound Pipes for Communication

BMAd Koalas Possess Human-like Fingerprints (A curious but probably incidental connection.)

BMAe Adhesive Thumbs of Bats Requiring Innovative Evolution
e.1 Suction Pads
e.2 Mechanical Velcro-Type Adhesion
e.3 Glueing

The marsupial striped possum from Australia not only looks like an American placental skunk, but it also produces an unpleasant odor. (R.M. Nowak; Walker's Mammals of the World, 1991.) [BMA51]

BMAf Unusual Dimorphism in Orcas (e.g.; resident and transient varieties) [BMA3]

BHAg Nonfertile Female Baboons Develop Features Suggesting Sexual Receptiveness (i.e.; to deter males from killing young)

BMB UNUSUAL MAMMALIAN BEHAVIOR

BMB1 The Adaptedness and Success of Marsupials (i.e.; despite competition from supposedly superior placental mammals)

BMB2 Some Mammals Resist Conditioning by the Behaviorists (Pigs, raccoons, and others won't play laboratory games!)

BMB3 Mammal Activity Level Correlated with the Moon (i.e.; as confirmed in both the field and laboratory)

BMB4 Anomalous Altruism (Here, we deal with altruism that cannot be related to "kin" or "reciprocal" altruism.) (e.g.; Barbary sheep "chivalry")

BMB5 Mammal Intelligence: Anecdotal Evidence (The abundant tales also include examples of sheer mammalian stupidity.)

BMB6 Evolutionary Overshoot in Mammalian Intelligence (The great apes exhibit much more intelligence than needed for survival.) [BHB14, BHBd, BHBl, BHBz]

BMB7 Progressive Learning Improvement in Successive Generations of Mammals (Evidence for Lamarckism in experiments with mice and rats.)

BMB8 The Transfer of Learning via Brain Extracts (e.g.; experiments with rats) (But in what form is such information transferred?)

BMB9 Behavior Correlated with Lunar Distance at Birth (e.g.; rat ambulatory-behavior experiments)

BMB10 Mammalian Art and Music
- 10.1 "Drawings" by Chimps, Dogs, and Elephants
- 10.2 Mice Fascinated (Mesmerized) by Music [BMT8]

BMB11 Handedness in Mammals (e.g.; common but strongest in the cetacea)

BMB12 Curious Forms of Locomotion
- 12.1 Whale Tail-Sails
- 12.2 Shrews Running on Water
- 12.3 Armadillos Walking across Stream on Bottom
- 12.4 Side-Swimming Cetaceans (e.g.; susus, which are river dolphins)

Right whales have been observed using their tails as sails during very windy weather. (R.M. Nowak; Walker's Mammals of the World, 1991.) [BMB12]

BMB13 Mammals That Waltz and Weave for No Apparent Reason (e.g.; waltzing mice and weaving elephants)

BMB14 Predator-Prey Mismatches (Dolphins and toothed whales often cannot match the speed and maneuverability of their prey, suggesting sound is used to confuse, stun, or kill prey.)

BMB15 Curious Lures Used by Mammals
15.1 Tails (e.g.; jaguars)
15.2 Erratic Behavior (e.g.; stoats, mongooses) [BMX7]

BMB16 Novel Escape Tactics
16.1 Rolling Downhill (e.g.; rolled-up pangolins) [BAAat]
16.2 Backtracking (e.g.; Arctic hares)
16.3 Leading Predators into Barbed-Wire Fences (e.g.; jack rabbits)

BMB17 Feigning Death (e.g.; opossums, occasionally, don't count on it)

BMB18 Anomalous Selection of Prey (i.e.; "survival of the fittest" questioned)

BMB19 The Puzzle of Flavor Aversion (Rats' aversion to food that causes illness, even if illness is long-delayed.) [BABt]

BMB20 The Scarcity of Vampirism in Nonhuman Mammals (i.e.; only 3 bat species out of 900± species) (Note that humans vampirize cattle and horses regularly)

BMB21 The Use of Medicinal Plants by Mammals (e.g.; chimps, some monkeys, elephants)

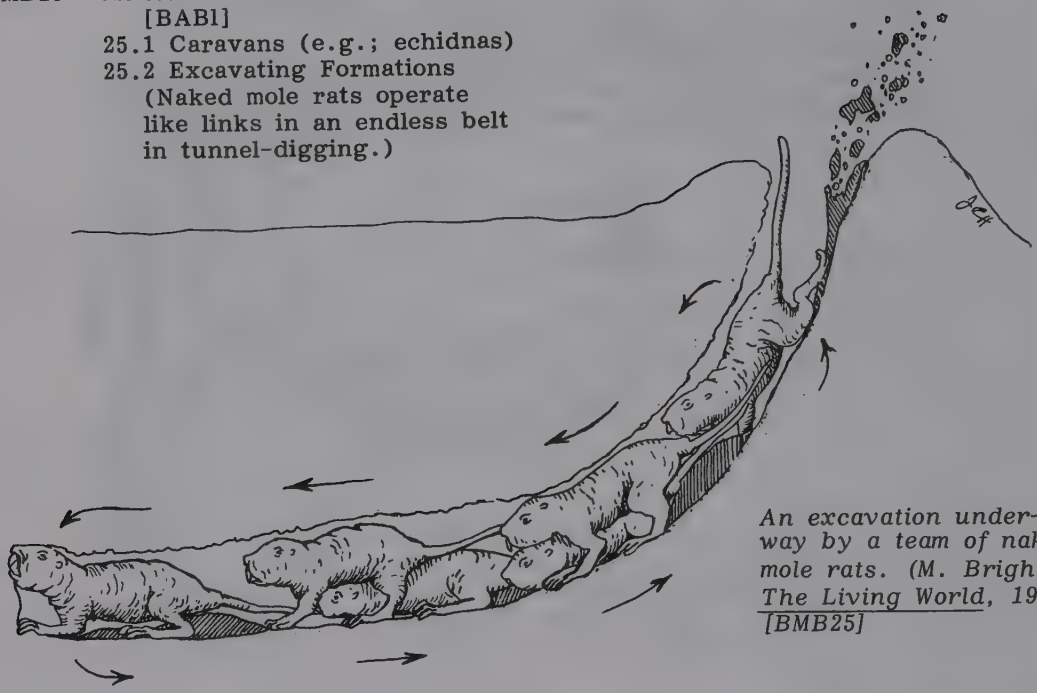
BMB22 Unrationalized Murder in Mammals
22.1 Murder of Close Relatives (e.g.; prairie dogs)
22.2 Murder during Rapes (e.g.; elephant seals, orang-utans)

BMB23 Face-to-Face Copulation in Mammals
23.1 Obligate in Cetaceans and Sirenia
23.2 Optional But Frequent in Apes and Pinnipeds
23.3 Optional But Invariable in Beavers (Note that beavers, alone among mammals possess cloacas.)

BMB24 Mammal Sexual Cycles Correlated with Lunar Cycle

(e.g.; prosimians, some tropical rats)

BMB25 Linear Formations of Mammals [BAB1]
25.1 Caravans (e.g.; echidnas)
25.2 Excavating Formations (Naked mole rats operate like links in an endless belt in tunnel-digging.)



An excavation underway by a team of naked mole rats. (M. Bright; The Living World, 1987.) [BMB25]

25.3 Bridges (e.g.; some New World monkeys)
25.4 Linear Sleeping Formations (e.g.; some bats)

BMB26 Circular and Ring Formations of Mammals
26.1 Grazing Circles (e.g.; sheep)
26.2 Circular Mating Trenches (e.g.; echidnas)

BMB27 Radial Formations or "Kings" (e.g.; rats, gray squirrels with curiously entangled tails)

BMB28 Mass Movements of Mammals That Do Not Normally Migrate (e.g.; lemmings, gray squirrels, Chinese mice)

BMB29 Collective Hunting Techniques (e.g.; cetaceans create bubble-traps)

BMB30 Unusual Assemblies of Mammals
30.1 Apparent Funerals (e.g.; red foxes)

BMB31 The Existence of Eusocial Mammals (e.g.; naked mole rats, prairie dogs)

BMB32 Unusual Aerial Displays
32.1 Unusual Leaping (e.g.; the "stotting" of Thomson's gazelles)
32.2 Aerial Spinning (e.g.; spinner dolphins)

BMB33 Mass Strandings of Live Cetaceans (They often cannot be deterred by human intervention. Many explanations have been proposed.)

BMB34 Live and Mummified Seals Found Far Inland in Antarctica (e.g.; crabeater seals)

BMB35 Unusual Anointing in Mammals
34.1 Anting (e.g.; gray squirrels)
34.2 Self-Anointing (e.g.; hedgehogs)

BMB36 Miscellaneous Curiosities of Mammal Behavior
36.1 Seal Stone-Swallowing
36.2 Porcupine Precopulatory Rites (e.g.; urinating on female)
36.3 Elephant Musth
36.4 Attraction to Electrical Equipment (e.g.; martens, possums, squirrels)
36.5 Hares Racing Trains
36.6 Berserk Cows
36.7 Impala Tongue-Flashing
36.8 Elephant Fascination with Their Dead and Bones
36.9 Strange Sloth Defecation

Routine

BMBa Bat Leaf-Wrapping (i.e.; for warmth and camouflage) [BMA19]

BMBb Male Giraffes Use Their Long Necks for Fighting [BMA47]

BMBc Beaked and Sperm Whales Pump Their Food in with Tongues

BMBd Chimps Are Vicious Predators of Monkeys (i.e.; even though cute and clever)

BMBe Strong Convergence of Social Behavior of Elephants and Sperm Whales

BMBf Mammalian Expressions of Emotion (e.g.; elephant weeping) [BHF30]

BMBg Mole-Rat Dispersive Morphs (Individuals with special body form and behavior designed to travel and establish distant colonies.)

BMBh Gene Insertion Increases Mouse Intelligence

BMBi Laughing in Nonhuman Mammals (e.g.; dogs?)

BMBj Unexpected Numeracy in Mammals (i.e.; the number sense) (e.g.; rhesus monkeys)

BMBk General Lack of Self-Awareness in Mirror Experiments (e.g.; chimps and dolphins are possible exceptions)

BMBl Chimps Engage in Trading with Humans (i.e.; bartering)

BMBm Young-Elephant Rampages (e.g.; attempting to mate with female rhinos)

BMC MAMMALIAN CHEMICAL AND PHYSICAL PHENOMENA

BMC1 Biochemicals That Challenge an Evolutionary Origin (e.g.; anticoagulants, poisons, toxic-chemical binders, etc.) (These epitomize the complexity-and-sophistication doubts about Neodarwinism. It is, however, impossible to deny the potential efficacy of random mutation and natural selection here and elsewhere.)

BMC2 Claimed Lunar Effects on Mammalian Biochemistry (e..g.; golden hamster urinary volume and acidity)

The solenodons of Cuba and Hispaniola possess a toxic saliva, as do North American shrews. (R.M. Nowak; Walker's Mammals of the World, 1991.) [BMC1]

BMC3 Some Biochemical Curiosities in Mammals

3.1 Unusually Rapid Corpse Decay (e.g.; shrews) [BBC3]

3.2 Crystals in Cells (e.g.; big-eared bats)

BMC4 The Inability of Some Mammals to Synthesize Ascorbic Acid (This inability seems to link distantly related species.) (e.g.; humans, birds, and marine mammals) [BBC8, BHC10]

BMC5 Anomalies Observed in the Cytochromes-Percent-Sequence Difference Matrix (i.e.; transitional biochemical forms do not exist between subclasses of life-forms) (e.g.; mammals and birds)

BMC6 Miscellaneous Blood and Biochemical Differences among Mammals

6.1 Guinea-Pig Biochemistry Differs Sharply from That of Rodents

6.2 Camel Family Has Elliptical Erythrocytes (In all other mammals they are round.)

BMCa Claim that Female Dogs' Urine Kills Grass But Males' Does Not (Perhaps because females puddle while males sprinkle!]

BMCb Remarkable Biochemical Convergences
b.1 Camel and Shark Immune Protein
b.2 Elephant and Insect Pheromone

BMCc Possum Hemoglobin Advanced, Not Primitive

BMCd Male Pheromones Control Female Pregnancy (e.g.; rodents)

BMCe Mammalian Erythrocytes Are Unnucleated (The red blood cells are formed with nuclei and mitochondria, but these structures are "squeezed out." The erythrocytes of reptiles and birds are nucleated.)

BMD DISTRIBUTION OF MAMMALS IN SPACE AND TIME

BMD1 Remarkable Congregations and Concentrations of Mammals
1.1 Congregations (e.g.; Mexican free-tailed bats)
1.2 Concentrations (e.g.; rice rats, Chile, 1,800 per hectare)

BMD2 Apparent Dearths and Absences of Mammals in Specific Areas (i.e.; many examples of shrinking biodiversity)

BMD3 Cycles in Mammal Populations (e.g.; lemmings, snowshoe hares, voles)

BMD4 Exotic Mammals (e.g.; claims of kangaroos in North America)

BMD5 Geographically Separated Populations of Flightless Mammals (e.g.; seals in Lake Baikal) (An ancient connection to the sea is suggested.)

BMD6 Sharp Zoogeographical Divisions Despite Minimal Barriers to Movement (e.g.; Wallace's Line in Australasia)

BMD7 Decrease in Biodiversity with Latitude (i.e.; an expected but not well-understood phenomenon)

BMD8 Curious Preference for Frequenting Certain Geological Formations (e.g.; elephants like sandstone) (This might be associated with the type of food grown.)

BMD9 Entombed Living Mammals (e.g.; claim of bats) [BSDc]

BMD10 Claims of Late Survival of Mammoths and Mastadons

BMD11 Current or Very Recent Survival of Giant Ground Sloths in South America

Some claim that the giant ground sloth still survives in South America. It was (is?) about 15 feet tall. (Nature Conservancy, p. 7, July/August 1994.) [BMD11]

BMD12 Claims of the Current Survival of the Thylacine or Marsupial Tiger/Wolf

BMD13 Current or Very Recent Survival of Steller's Sea Cow

BMD14 Miscellaneous Potential Late Survivors (e.g.; giant lemur, pre-European contact North American camels and horses)

BME THE FOSSIL RECORD OF MAMMALS

BME0 New and Paradigm-Shifting Fossils Are Found Frequently (In other words, many of the observations below are subject to change.)

BME1 Scarcity of Transitional Fossils in the Class Mammalia (e.g.; claimed reptile-mammal gap, whale-evolution controversies, missing chimp ancestors, etc.)

BME2 Persistence of Certain Mammalian Morphological Forms in the Fossil Record (i.e.; "living fossils") (e.g.; opossum lineage)

BME3 Explosive Radiations in Mammalian Evolution (The most important radiation followed the Cretaceous-Tertiary extinctions. Possibly the supposed asteroid impact opened up new biological niches, but this does not really explain increased speciation.)

BME4 Unexplained Extinctions of Large Mammals in the Late Pleistocene (Varying dates and mechanisms proposed for the different continents. Debate rages about the human factor.)

BME5 The Failure of Evolution to Improve Mammal Survivability (The claim is that extinction probability has not improved, but this is difficult to prove.)

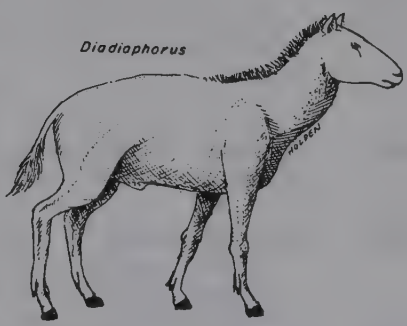
BME6 Anomalously Early Fossils (e.g.; placentals in Australia 55 million years ago) [BME9]

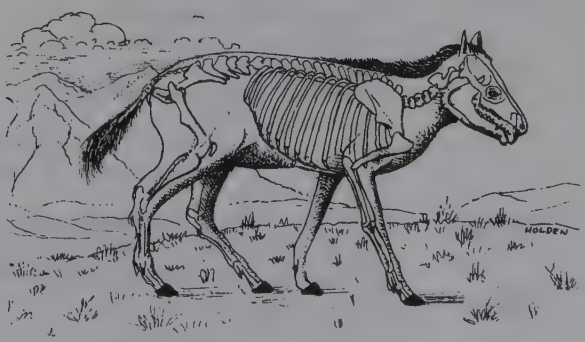
BME7 Track-Like Markings in Ancient Strata Resembling Mammalian Footprints (e.g.; horse-like tracks, Permian rocks, 250 million years old, Grand Canyon)

BME8 Mammals with Histories Known Only from Subfossils (A very recent evolution is suggested.) (e.g.; lemurs and polar bears) [BME9.4]

BME9 Anomalous Distribution of Mammalian Skeletal Material
- 9.1 First Appearance of Primates in North America Rather Than Africa [9.6]
- 9.2 Pinnipeds Restricted to Pacific for Millions of Years (Despite easy access to the Atlantic because the Isthmus of Panama was submerged.)
- 9.3 Possible (New World) Xenarthran (Sloth-Like) Fossils in Europe
- 9.4 Polar-Bear Fossils Challenge Ice-Age Theory (Fossils 60,000 years old in Norway, which was supposedly under a thick ice cap.)
- 9.5 Early Placental-Mammals in Australia [BME6]
- 9.6 Eurasian Origin of Great Apes [9.1]
- 9.7 African Origin of Lemurs Doubted
- 9.8 Advanced Mammals Evolved in North and South, Not South Only
- 9.9 Marsupial Fossils from Mongolia and Madagascar
- 9.10 Elephants in North and South America before Isthmus of Panama Land Bridge

BME10 Parallelisms in the Mammalian Fossil Record (There were "true" horses in North





Externally and internally, the South American "false horse" looked much like a "true horse." (Earth Science Digest, 4:9, 1950.) [BME10]

America and "false" horses in South America!)

BME11 Pleistocene Dwarfing of Some Mammals (e.g.; small wooly mammoths, Canadian Arctic; dwarf mammoths, Santa Rosa, Island, California)

BME12 Variations in Mammalian Teeth and Skeletons Show a Definite Direction of Evolution (A highly subjective determination.)

BMEa Curious Accumulations of Crushed Baboon Skulls

BMEb Fossils of Marine Sloths (Certainly unexpected, although today's sloths do swim rivers.)

BMEc Fossil Evidence for Whale Adaptation to Salt Water (Osmoregulation equipment had to be evolved) [BME1]

BMEd Fossils of Bipedal Apes Exist

BMEe Mysterious Origin and Relationships of Multituberculates (These were the only mammalian herbivores of the Mesozoic.)

BMEf Fossils Indicate That Climate Changes Had Little Effect on Mammalian Evolution

BMF BODILY FUNCTIONS OF MAMMALS

BMF1 Water-Breathing in Mammals (Some mammals can breathe oxygenated water in lab experiments.)

BMF2 Remarkable Adaptations in Deep-Diving Mammals (e.g.; avoidance of the bends)

BMF3 Oddities of Digestion
- 3.1 Quasi-rumination (e.g.; the babirusa)
- 3.2 Reingestion or coprophagy (e.g.; the lagomorphs, such as rabbits)

BMF4 Perpetual Growth in Mammals (e.g.; beavers, red kangaroos) [BFFh, BRFn]

BMF5 Regeneration in Mammals
- 5.1 Limbs (e.g.; mice, opossums) [BHF13]
- 5.2 Ears (e.g.; mice) [BHF13]

BMF6 Anomalies of Hibernation in Monotremes (i.e.; monotremes are considered primitive but hibernation is an "advanced" trait) (e.g.; echidnas)

BMF7 The "Winter Sleep" of Bears (Not true hibernation but involves unique biochemical processes.)

BMF8 Freeze-Avoidance in Hibernating Mammals without Antifreeze Solutes (How they do it remains a mystery.)

BMF9 Cold-Blooded Mammals (Poikilotherms) (e.g.; naked mole rats)

BMF10 Transmission to Progeny of Adaptations Induced by Low Temperature (e.g.; in laboratory mice) (Obviously a plus for Lamarckists.)

BMF11 Inheritance of the Effects of Rotation on Physiology and Behavior

BMF12 Male Lactation in Wild Mammals (e.g.; Dayak fruit bats) (Also occurs in humans.) [BHFac]

BMF13 Asymmetry in the Function of Mammary Glands (i.e.; the production of two kinds of milk for different offspring) (e.g.; red kangaroos)

BMF14 Impressive Evolution of Pressurized, Sealed Suckling Systems (e.g.; marsupials and cetaceans)

BMF15 The Ability of One Mammal to Control the Sexual Functions of Another (Usually accomplished chemically via pheromones.)
- 15.1 Sexual Maturation (e.g.; mice, orang-utans)
- 15.2 Estrus Cycle (e.g.; bush dogs)
- 15.3 Ovulation (e.g.; marmosets, naked mole rats)

BMF16 Correlation of Primate Menstruation with Lunar Phase (e.g.; some higher primates) [BHF14]

BMF17 The Delayed-Birth Phenomenon
- 17.1 Delayed Implantation (e.g.; pinnipeds, armadillos)
- 17.2 Delayed Development of Embryo (e.g.; some bats)
- 17.3 Delayed Fertilization (e.g.; some bats)

BMF18 Polymorphic Sperm in Mammals (i.e.; fertilizing sperms, "kamikaze" sperm, cooperative sperm, altruistic sperm)

BMF19 Pregnancy Rates Correlated with Lunar Phase (e.g.; Malayan forest rats)

BMF20 Maternal Impressions in Mammals (e.g.; claim for a pig) [BHF21]

BMF21 Emotional Weeping in Nonhuman Mammals (e.g.; restricted to marine mammals, elephants) [BHF30]

BMF22 Sleeplessness in Mammals (e.g.; possibly cattle) (This determination is difficult to make in the field.)

BMF23 Curious Types of Sleep
23.1 Underwater Sleep (e.g.; elephant seals)
23.2 Episodic Sleep (e.g.; marsupial moles)
23.3 Half-Brain Sleep (e.g.; dolphins)
23.4 Nightly Resurrections (e.g.; many mammals) (Described as a general, temporary awakening around 2 A.M.)

BMF24 Absence of REM Sleep in Echidnas

BMF25 Big-Bang Reproduction (Semelparity) in Mammals (Many marsupials reproduce in this manner. All males usually die after matings.)

BMF26 Unusual Deaths of Mammals (e.g.; shrews killed by loud noises)

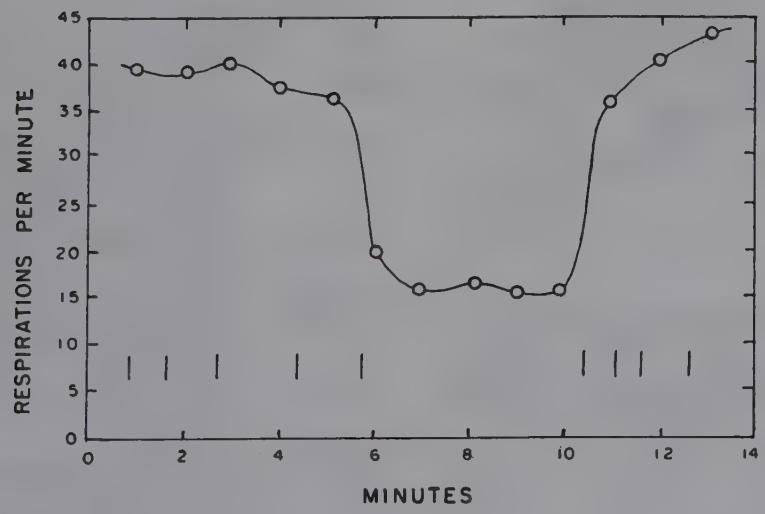
BMF27 Longevity Increased by Radiation and Hunger

BMFa Controverted Purpose of Mammalian Menopause [BHF18, BHFb]

BMFb Dreaming in Nonhuman Mammals (e.g.; laboratory rats, as measured by their brain waves)

BMFc Sperm-Free Fertilization (i.e.; with cells of another mouse)

BMFd Unexplained Weight Transients at the Moment of Death (e.g.; experiments with sheep) (This sound bizarre but probably has mundane explanation.)



These short periods of slow breathing seem to be the closest cows get to true sleep. (Nature, 175:940, 1955.) [BMF22]

BMG MAMMALIAN GENETICS

BMG1 Discordances between Phylogenies Established from Visible Traits and Those from Genetics (e.g.; greater and lesser pandas) (The former is a true bear, but DNA shows the latter to be related to racoons.)

BMG2 Closely Related Mammals with Different Chromosome Numbers
2.1 Horse Family (Hartmann's zebra has 32 pairs of chromosomes, Grevy's zebra has 46.)
2.2 Different Sexes of Same Species (e.g.; the marsupial Dromiciops australia, the placental Aotus azarae)

Male South American "night monkeys" (Aotus azarae) have one less chromosome than the females. (K.H. Redford and J.F. Eisenberg; Mammals of the Neotropics, 1992.) [BMG2]

BMG3 Evolution Rates That Are Much Higher Than Predicted from Genetics (e.g.; whales)

BMG4 Unexplained Rapid Evolution in Inbred Mice

BMG5 Species with Cells Containing "Alien" Mitochondria (The cells of some animals contain mitochondria typical of other species.) (e.g.; some European mice)

BMG6 Paternal Mitochondrial DNA Can Be Inherited in Mammals (e.g.; as demonstrated in laboratory mice)

BMG7 Functions of "Knocked-Out" Genes Not Completely Lost (i.e.; functions assumed by other genes)

BMG8 Aramdillo "Identical" Quadruplets Are Not (The ova do not split evenly into four identical parts.)

BMGa Epigenetic Inheritance (e.g.; fur color in mice)

BMGb Cloned Animals Age Quickly

BMGc Radiation-Resistant Mice at Chernobyl [BATak]

BMGd DNA in Food Can Enter Cells of Consumers (Could this be a factor in evolution?)

BMGe Dog mtDNA Highly Variable (This implies longer period of evolution than usually supposed.)

BMGf Monotremes Are Progenitors of Marsupials (Hardly unexpected!)

BMGg Rabbits More Closely Related to Humans than to Rodents

BMGh DNA Analysis Indicates That Guinea Pigs Are Far-Removed from Rodents (Despite the fact that really they look like rodents!)

BMGi DNA Molecular Clocks and the Fossil Record Yield Radically Different Ages for the First Primates

BMGj Mutation Rate in Sperm Increases with Age

BMGk Clones Have Mixed DNA

BMGl Mammals Were Already Highly Diversified before Age of Dinosaurs

BMGm Oliver Is Genetically a Chimp [BMA4]

BMGn Genetically Bats Are Monophyletic (This despite the many morphological differences between the micro- and megabats.) [BMI6, BMO3]

BMGo The Four Species of River Dolphins Evolved Separately (Yet, they all have very long snouts and degenerating eyesight.)

BMI INTERNAL SYSTEMS AND STRUCTURES

BMI1 Inheritance of Acquired Immunological Tolerance (e.g.; claimed for laboratory mice)

BMI2 Immunity to Rattlesnake Venom (e.g.; pig family)

BMI3 Tropical Mammals with Thick Subcutaneous Fat (e.g.; sirenia, cetacea, hippos) [BHI14]

BMI4 Curiosities of Mammalian Urogenital Systems
- 4.1 Common Urogenital/Feces Orifices (e.g.; monotremes)
- 4.2 Common Urogenital Orifices (e.g.; insectivores, sloths, and other xenarthrans)
- 4.3 Mammalian Cloacas (e.g.; beavers
- 4.4. Marsupials Have Double Birth Canals
- 4.5 Hyenas Give Birth through Clitoris (Painfully!)

In the spotted hyena, the vaginal canal emerges at the oversized clitoris. Birth takes place (painfully) through this unusual passage. (New Scientist, p. 38, March 5, 1994.) [BMI4]

- 4.6 Male Belugas Sometimes Develop a Uterus
- 4.7 Some Bandicoots (Marsupials) Have a Primitive Type of Placenta
- 4.8 The Female Egg-Laying Platypus Has Only One Functional Ovary (i.e.; like most but not all birds, as in some raptors) [BBO8]

BMI5 Reversal of Viscera (Sinus Inversus Viscerus (e.g.; cats, mice) [BHA9, BMA5]

BMI6 Fundamental Differences between Micro- and Megabat Neural Pathways (The latter's is like that of primates.) [BMGn]

BMI7 Evolution without Associated Increases in the Complexity of Vertebral Columns [BMIb]

BMI8 Magnetite in Mammals (i.e.; supposedly for navigation) (e.g.; some dolphins, beaked whales, bats, mice) [BHT17, BHT18, BMT1]

BMIa Complexity and Sophistication of Dolphin Heat Exchangers

BMIb Remarkable Conservation of 7 Neck Vertebrae in Mammals (e.g.; bats, giraffes, etc.) [BMA47. MBI7]

BMIc Some Marsupial Infants Breathe through Their Skin

BMId Elephant Pleural Cavity and Kidneys Consistent with Deep Diving (i.e.; marine origin)

BMIe Feral Pigs Adapt to Salty Vegetation and Lack of Fresh Water (e.g.; Ossabaw Island, Georgia)

BMO MAMMALIAN ORGANS

BMO1 High Complexity and Sophistication of the Mammalian Eye [See BMC1, BHO1 for discussion of these properties.]

BMO2 Blindsight (Clinically blind animals can identify some events without forming images) [BHT3, BHT10]

BMO3 Remarkable Adaptations of Mammalian Eyes
- 3.1 Rudimentary Eyes as Photoperiod Sensors (e.g.; blind mole rats)
- 3.2 Aquatic Eyes (i.e.; with spherical lenses, flatter cornea, etc.) (e.g.; marine mammals)
- 3.3 Presence of the Tapetum

to Enhance Night Vision (e.g.; pottos)
3.4 Megabats Have Color Vision, Microbats Do Not [BMGn]

BMO4 The Purposeful Emission of Sound by Mammalian Ears [BHO9]

BMO5 Mammals Apparently Sensitive to Barometric Pressure (e.g.; some bats)

BMO6 Complexity and Sophistication of Some Microbat Ears [BMO1]

BMO7 Innovation and Adaptation in the Auditory Subsystems of Echolocating Cetaceans

BMO8 Repeated Development of Electrosensitivity in Mammals (e.g.; platypuses, star-nosed moles) [BFOk]

The 22 writhing tentacle-like structures of the star-nosed mole are sensitive to electric fields generated by its prey. (Discover, 14:16, August 1993.) [BMO8]

BMO9 Parallelisms in the Tongues and Teeth of Specialized Feeders (e.g.; in ant/termite eaters, nectar/pollen eaters)

BMO10 Innovations in Sound-Generating Organs
10.1 For Communication (e.g.; elephants, cetaceans) (Note that elephants and some other mammals stomp the ground to communicate.)
10.2 For Echolocation (e.g.; tenrecs, bats, cetaceans)

BMO11 Absence of REM Sleep in Echidnas (This has been contested.)

BMO12 Repeated Independent Development of a Key Part of the Carnivore Brain (i.e.; the cruciate sulcus, not present in common ancestors)

BMO13 Microbat Information Processing: Brain Complexity and Sophistication [BMO6]

BMOa Trichromatic Vision [BHO5]
a.1 In Prosimians
a.2 In Howler Monkeys (only New World monkey so endowed)

BMOb Asymmetry of Mammalian Brains

BMOc Signals from Mammalian Eyes Set Circadian Clocks

BMOd New Neurons Can Be Generated in Mammmalian Brains (A long-held impossibility.)

BMOe Whales Possess Bichromatic Vision and are Color-Blind to Blue (This is curious because blue light penetrates seawater well.)

BMOf Mole-Rat Neurons Sensitive to Magnetic Fields

BMOg Puzzle of Noncircular Pupils in Some Mammals
h.1 Vertical (e.g.; cats) [BBO8]
h.2 Horizontal (e.g.; goats, horses)

BMOh Cetaceans and Higher Primates Lack Vomeronasal Sense)

BMT UNUSUAL FACULTIES AND TALENTS OF MAMMALS

BMT1 Magnetic Orientation and Navigation in Mammals (e.g.; experiments with mice) [BRT6]

BMT2 Long-Range Navigation in the Absence of Recognized Cues [BATg, BFTf, BRTe, BRTi, BSTb]
2.1 Homing Experiments (e.g.; mice, bats, cats, dogs. etc.) [BBT5, BHT18, BRTa]
2.2 Migratory Species, Implying a Navigation Sense (e.g.; seals, whales) [BBT4]
2.3 Observations of Under-Ice Navigation between Breathing Holes (e.g.; seals)
2.4 Dolphins and Whales Use Sonar to Locate Underwater Features (i.e.; seamounts)

BMT3 Short-Range Operational Prowess Despite Suppressed Visual and Olfactory Cues;

(i.e.; many techniques used, such as sonar, electric fields, sensing water currents, dead reckoning) [BRTa]
3.1 Field Observations (e.g.; bats, cetaceans, moles, etc.)
3.2 Controlled Experiments (e.g.; bats, cetaceans, seals, tenrecs, hamsters)

BMT4 Mammal Behavior Implying the Existence of Other Unrecognized Senses [BBT10, BFTg, GQB1]
4.1 Earthquake Premonitions (e.g.; cats, cattle, etc.) [BRTj]
4.2 Weather Premonitions (e.g.; bandicoots, prairie dogs)
4.3 Lightning Premonitions (e.g.; horses)
4.4 X-Ray Sense (e.g.; cats)
4.5 Claimed Nonhuman Mammalian ESP (e.g.; rabbit experiments)

BMT5 Curious Examples of Soaring and Parachuting Mammals [BFTj, BRAf, BSAi]
5.1 Soaring (e.g.; flying squirrels)
5.2 Parachuting (e.g.; cats)

BMT6 Unusual Swimming Capabilities of Terrestrial Mammals (Elephants have been seen swimming tens of miles from land.)

BMT7 Remarkable Diving Capabilities of Distantly Related Mammals (e.g.; seals and whales) [BRTk]

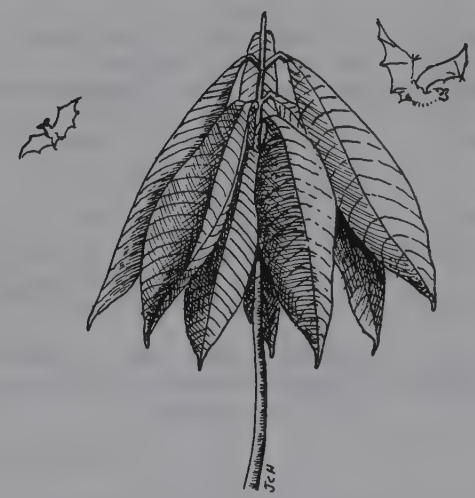
BMT8 Unusual Vocalizations in Mammals
8.1 Solo Vocalizations (i.e.; songs often display high complexity, hint of a grammar) (e.g.; mice, bats, seals, whales, elephants, okapis, etc.) [BBT22]
8.2 Mammal "Conferences" (e.g.; gorillas, dolphins) [BBB40]
8.3 Duetting and Chorusing (e.g.; mice, indris, whales) [BBT20]
8.4 Elephant and Other Mammals Use Infrasound
8.5 Hippo Mysterious Underwater Clicks (i.e.; not for hunting or navigation)

BMT9 Seismic Communication (e.g.; elephants, rabbits, agoutis, blind mole-rats, etc.) [BATs, BSTb]

BMT10 Mammals That Imitate Human Words (e.g.; chimps, dogs, harbor seals) [BBT17]

BMT11 Tool Use and Manufacture (e.g.; apes, monkeys, sea otters, elephants, etc.) [BBT32]

BMT12 Mammalian Engineering Works
12.1 Houses and Shelters (e.g.; beavers, some rats, tent-building bats) [BATv, BBT28]
12.2 Dams (e.g.; beavers)
12.3 Canals (e.g.; beavers)
12.4 Mines (e.g.; elephants)
12.5 Dew-Catchers (some mice)
12.6 Bridges (e.g.; orang-utans)



A wigwam leaf shelter constructed by tent-making bats. (L.H. Emmons; Neotropical Rainforest Mammals, 1990. [BMT12]

BMTa Chimps Mark Trails with Vegetable "Notes"

BMTb Whales Detect Ice Holes by Sonar

BMTc Use of Natural Medicines
c.1 Chimps Know and Use Plants with Medical Value [BBT29]
c.2 Chimps Repel Skin Parasites with Millipede Secretions

BMTd Dogs Sense Onset of Human Epileptic Seizures

BMTe Dogs Detect Human Cancers
BMTf Cats Lure Birds by Mimicking Their Calls [BBT17]
BMTg "Signing" Apes Controversy
BMTh Desert Porcupines Dig Holes to Create Tiny "Oases" (i.e.; collected water attracts other animals)

BMU UNRECOGNIZED MAMMALS

BMU1 MacFarlane's Bear: A Yellow Giant
BMU2 The Onza: An Unrecognized North American Cat? (DNA suggests a puma)
BMU3 De Loy's Ape or Mono Grande
BMU4 The Minhocao: A Giant Armadillo?
BMU5 The King Cheetah: Evolution in Progress?
BMU6 The Spotted Lion or Marozi
BMU7 The Mngwa or Nunda
BMU8 The Nandi Bear: Bear-Like But Not a Bear
BMU9 Bunyips and Waitorekes: Errant Seals, Sea Lions, and/or Otters? (BRU]
BMU10 Steller's Sea Ape
BMU11 Unrecognized Marine Mammals Popularly Characterized as "Sea Serpents" [BRUc, BRUd]
BMU12 Cetaceans with Two Dorsal Fins
BMUa The Koolookamba (a new species of chimpanzee?)

BMX MAMMALIAN INTERFACE PHENOMENA

BMX1 Curious Associations of Mammals
1.1 Living Together (e.g.; red foxes and woodchucks)
1.2 Warning and Feeding (e.g.; baboons and bush bucks)
1.3 Strange Dolphin-Tuna Schooling Together
BMX2 Interesting Interspecies Associations Involving Hunting (e.g.; coyotes and badgers, mammals and honeyguides)
BMX3 Mammals Aiding Other Species in Distress (e.g.; dolphins and other cetaceans)
BMX4 Mammalian Mutualisms of More Than Usual Interest
5.1 Microorganisms (e.g.; in digestion)
5.2 Plants (e.g.; bat pollenation)
5.3 Birds (e.g.; oxpeckers)
BMX5 Do Predatory Mammals Kill the Unfit? (Generally no!)
BMX6 Unusual, Unprovoked Aggression among Mammals (e.g.; wolverines, transient orcas) [BBX1]
BMX7 Unusual Mammal-Animal Psychological Interfaces (e.g.; stoats fascinating rabbits, cats fascinating birds) [BBX2, BMB15]
BMXa Unusual Gut Symbionts (e.g.; nematode worms in tree kangaroos)
BMXb Sperm-Whale Encounters with Giant Squids
BMXc Existence of Gaia Questioned
BMXd A Parasite Makes Rats Unafraid of Cats

The "king cheetah" is larger than the usual cheetah and has stripe-like markings rather than spots. (M.A. Bille; Rumors of Existence, 1995.) [BMU5]

BR REPTILES[25]

BRA EXTERNAL APPEARANCE AND MORPHOLOGY
BRB UNUSUAL REPTILIAN BEHAVIOR
BRC REPTILIAN BIOCHEMICAL PHENOMENA
BRD DISTRIBUTION OF REPTILES IN SPACE AND TIME
BRE THE FOSSIL RECORD OF REPTILES
BRF REPTILIAN BODILY FUNCTIONS
BRG REPTILIAN GENETICS
BRI INTERNAL SYSTEMS AND STRUCTURES OF REPTILES
BRO ORGANS OF REPTILES
BRT UNUSUAL TALENTS AND CAPABILITIES OF REPTILES
BRU UNRECOGNIZED REPTILES
BRX REPTILE INTERFACES WITH OTHER ANIMALS

The first reptiles appeared in the Permian about 300 million years ago. During the subsequent eons, they split into several diverse orders, four of which still survive today: the lizards and snakes (which are lumped together), the crocodilians, the turtles, and New Zealand's oddball tuatara. The reptiles innovated profusely down the years, as can be seen in the following list of features:

- The development of a wide range of poisons for hunting and offense and, in addition, a group of antivenins to protect themselves;
- The appearance of mimicking colors and patterns. (The colorful and deadly coral snake is, in fact, mimicked by several snake species.)
- The attainment of flight by species now extinct, although some modern lizards and snakes are fair gliders between forest trees;
- The production of spines to condense moisture in desert environments;
- The appearance of warm-blooded species, such as the leatherback turtle; and
- The invention of cloacal gills by sea turtles.

Furthermore, we observe the following interesting points:

- Homology has been a conspicuous failure to explaining reptile phylogeny;
- Reptiles sometimes collect in incredible concentrations, such as a 10-feet-wide swath of sea snakes 60 miles long; and
- Many observations exist of sea and lake monsters (Loch Ness Monster, Ogopogo, Chessie, etc.) that have so far failed to yield flesh-and-blood bodies for scientists to examine.

BRA EXTERNAL APPEARANCE AND MORPHOLOGY

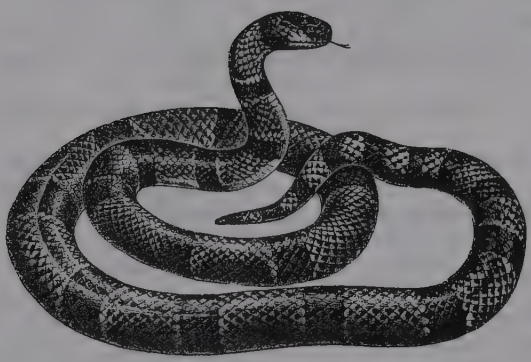
BRAa Skin Color Changes with Body Temperature (Skin turns dark to absorb sunlight when cold.) (e.g.; striped tree lizard, chuck walla) [BRAv, BSAg]

BRAb "Ecomorph" Reptiles (Those in which morphology is determined by the environment.) (e.g.; several Anolis lizards on different Caribbean islands, Darwin's marine iguanas, garter snakes)
b.1 Adaptation May Be Rapid
b.2 Near-Identical Environments Produce Near-Identical Species

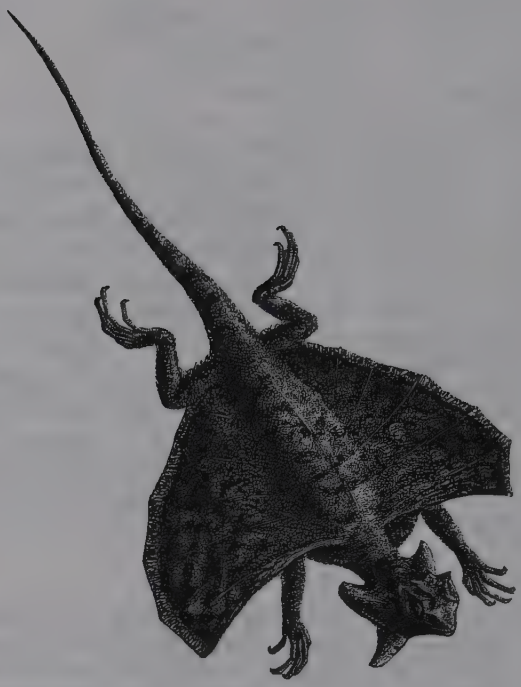
BRAc Interesting Reptile Terata (i.e.; "monsters")

c.1 Two-Headed Snakes
c.2 Two-Tailed Snakes
c.3 Double-Headed Turtles (i.e.; heads at opposite ends of body, so-called amphicephalous reptiles)
c.4 Claims of Double-Headed Snakes (Questionable data.)
c.5 Reptiles with Tail Mimicking Head (e.g.; stump-tailed lizard)

BRAd Coral-Snake Mimics (several harmless and mildly venomous snakes over wide geographical area)



The highly venomous coral snakes are boldly ringed with red, yellow, and black. Supposedly, these are warning colors to deter predators. Several non-poisonous snakes, such as the scarlet kingsnake, use the same color scheme, but the red and yellow are always separated by black. It is not known how useful this inaccurate mimicry is in promoting their survival. [BRAd]



The "flying dragon," actually only a gliding lizard. [BRAf]

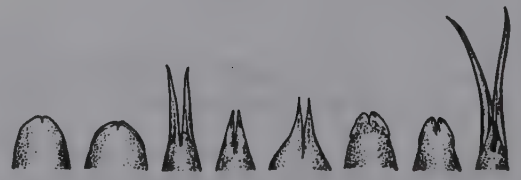
BRAe Male Morphological Mimicry of Female (The purpose is to increase mating opportunities.) (e.g.; garter snakes and others) [BFAe, BRBr]

BRAf Gliding Reptiles [BFTj, BMT5, BSAi]
f.1 Snakes (several Asian Colubrid species)
f.2 Lizards (e.g.; "flying gecko, Draco genus)

BRAg Forked Tongues in Reptiles Provide Directional Scent Sensor

BRAh Reptile Pouches and Pockets
h.1 Lizard Mite Pockets (This reflects a strange mutualism, in which the host evolves to accommodate another species.)

BRAi Snakes with Hinged Teeth [BMA30]



The tongues of snakes and lizards are diverse in shape. Those that are forked strongly apparently give their possessors a directional sense of smell. (Science, 263:1573, 1994.) [BRAg]

BRAj Snakes with Unique Hinged Jaws (e.g.; several Boid species on Mauritius, an island only a few million years old) [BRAaa]

BRAk Reptiles with Night-Shining Eyes (Interesting and common in the animal world, but not anomalous.) (e.g. crocodiles and alligators)

BRAl Snakes with Rudimentary Legs and Pelvis (e.g.; pythons) [BMA42]

BRAm Autonomous Discarded Tails (Lost tails that still retain the power to wiggle and distract predators.) (e.g.; several lizard species)

BRAn Reptiles with Third Eyes (e.g.; tuataras and other lizards)

BRAo Reptiles without Penises (i.e.; copulation is bird-like, cloaca-to-cloaca) (e.g.; tuataras)

BRAp Reptiles with Luminous Eggs (e.g.; some lizards)

BRAq Reptile Egg Oddities (e.g.; turtle egg containing grass)

BRAr Reptile Body Parts Used as Lures
- r.1 Worm-Like Appendages in Mouth (e.g.; snapping turtles)
- r.2 Tails (e.g.; boa constrictors)
- r.3 Tongues (e.g.; young garter snakes)

BRAs Giant Snakes (There are solid claims of anacondas over 36 feet long, but in the fringe literature one sees 80 feet!)

BRAt "Velcro" Feet (Intermolecular forces active here.) (e.g.; geckos that can walk on ceilings)

BRAu All-Female Populations (This assertion is hard-to-prove because sperm can be stored for long periods.)
- u.1 Some Lizards (Usually Attributed to Parthenogenesis.) (e.g.; New Mexico whiptail lizard) [BRBg, BRFe, BSAa]
- u.2 Snakes (e.g.; Asian Brahminy)

BRAv Remarkable Color-Changing Abilities (e.g.; chameleons, some geckos, etc.) [BRAa]

BRAw "Living Fossils" (i.e.; living reptiles with long paleontological histories) (e.g.; tuataras)

BRAx Reptile Groups with Amazing Weight Variations (e.g.; monitor lizards, five orders of magnitude)

BRAy Reptiles with Snorkels (e.g.; many soft-shelled turtles)

BRAz Reptiles with Remarkable Tongues
- z.1 Tongues with Suction Power (e.g.; chameleons)
- z.2 Tongues of Great Length (i.e.; longer than the body) (e.g.; chameleons, up to 2 feet long)

BRAaa Snakes with "Mandibular Raking" (These snakes have hinged jaws that flex in and out to draw in prey) (e.g.; threadsnakes) [BRAj]

BRAab Presence of Throat Teeth (e.g.; egg-eating snakes)

BRAac Snakes with Hair with Unknown Function (e.g.; Acrochordoids)

BRAd Inflatable Lizards (i.e.; baggy skin allows 300% inflation) (e.g.; chuckwallas)

BRAae Green and Blue Colors in Snakes Due to Guanophores, Not Pigments (i.e.; cells filled with irridescent crystals) [BAAi]

BRAaf Snake Teeth Are Rootless (i.e.; snakes have successive dentitions)

BRAag Presence of Spines to Condense Moisture (e.g.; thorny devil) [BAAq]

BRAah Snakes Posssess Hemipenises and Hemiclitorises

BRB UNUSUAL REPTILIAN BEHAVIOR

BRBa Claims That Snakes Swallow Their Young (The older science literature is filled with innumerable anecdotes.)

BRBb Lizards Running across Water (With the presence of surface tension, there seems to be no anomaly here.) (e.g.; basilisks)

BRBc Inferior Male Marine Iguanas Ejaculate into Special Pouch for Insertion before Being Pushed Off Females by Superior Males before Normal Copulation Can Occur

BRBd Snake Balls (i.e.; usually involving many males trying to copulate with one female) (e.g.; garter snakes) [BFBi]

BRBe Turtles Stomp for Worms (It is thought that the vibrations bring worms to the surface) (e.g.; wood turtles) [BBB18]

BRBf Curious Mass Falls of Lizards from Trees (Said lizards are almost exclusively male.) (e.g.; western fence lizards)

BRBg All-Female Lizard Species that Participate in Courtship Activities (Including attempted copulation.) (e.g.; whiptail lizards) [BRAu]

BRBh Lizards That Mimic Unpalatable Insects (e.g.; Eremias lugubris)

BRBi The Hoopsnake Myth

BRBj Reptiles Feigning Death (e.g.; hog-nosed snake, some lizards)

BRBk Claim of Maternal Impressions in Reptiles (i.e.; inheritance of effects of maternal experiences) (e.g.; an Australian skink) [BHF21, BMF20]

BRBl Dangers of Heads of Decaptivated Snakes (They do bite.) (e.g.; rattlesnakes)

BRBm Snakes That Attempt to Swallow Prey That Are Too Large (e.g.; anecdote of python trying to swallow a young elephant)

BRBn Sea Snakes Have Lost Ability to Travel on Land

BRBo Forms of Locomotion Used by Modern Snakes Are Radically Different from Those of Reptilian Ancestors (They are difficult to account for by small random mutations and natural selection. Snake locomotion arose separately several times in different parts of the globe.)

BRBp The "Board Snake" (i.e.; when captured it becomes rigid like a stick) (e.g.; Erpeton tantaculatum)

BRBq Blood-Spitting Snakes (The mechanism is unknown.) (e.g.; Tropodophis snakes) [BSBk]

BRBr Male Garter Snakes Emit Female Hormones to Decoy Other Males away from Females [BRAe]

BRBs "Vagabond" Female Turtles (i.e.; they return to different, far-separated beachs to lay their eggs) (e.g.; green turtles)

BRC REPTILIAN BIOCHEMICAL PHENOMENA

BRCa Some Snakes Produce Multipurpose Antivenins for Self-Protection (e.g.; snakes that eat other poisonous snakes)

BRCb Venom in the Same Species Varies Widely with Geography (Antivenins for humans must vary accordingly.)

BRCc Crocodile and Human Hemoglobin Remarkedly Similar

BRCd Different Families of Snakes Have Independently Developed a Great Variety of Venoms via Salivary Glands (Why Have Not More Mammals Evolved This Useful Weapon) [BACa, BMC1, BREk]

BRCe North American Rattlesnake Venom Becoming More Potent (Is this because of human activities?)

BRD DISTRIBUTION OF REPTILES IN SPACE AND TIME

BRDa Remarkable Reptile Concentrations

a.1 In 1880, 80 Square Miles of Green Turtles Floating on Their Backs, Gulf of Mexico

a.2 In 1932, a Line of Sea Snakes 10 Feet Wide, 60 Miles Long, Malacca Straits, Astrotia stokesii

BRDb Sea Snakes Unknown in Atlantic (Despite former easy access when the Isthmus of Panama was submerged.) [BME9]

BRDc Displaced Alligators and Crocodiles

c.1 Escapees from Captivity (e.g.; famous alligators-in-the-sewers stories and

similar tales)
c.2 Natural Wanderers (e.g.; alligators in Oklahoma, the Bahamas, Potomac River; salt-water crocodile on Rotuma, 260 miles north of Fiji.
c.3 Relict Crocodiles in a Rare Saharan Waterhole
c.4 "Missing Year" Phenomenon in Lives of Sea Turtles in Southeastern U.S.

BRDd Strange Geographical Distribution of Iguanas (They are known in the Americas, the Galapagos, Madagascar, Fiji, Tonga, but not in Europe, Asia, or Africa

BRDe Crocodiles Survived the Cretaceous-Tertiary Catastrophe That Helped Wipe Out Dinosaurs (How did these reptiles escape?)

BRDf Extraordinary Abundance and Diversity of Lizards in Australia (Of course, this cannot be considered anomalous. But visitors to Australia will be impressed!)

BRDg First-Year Red-Lined Garter Snakes Never Found in Winter Dens (No one knows where they winter.)

BRDh Two Sea Snakes Found in Fresh-Water Lakes (e.g.; Hydrophis serpenti, Laticauda crockeri)

BRDi The Snake That Ate Guam. (Actually, anything it could catch and swallow.) (e.g.; the brown tree snake)

BRE THE FOSSIL RECORD OF REPTILES

BREa Puzzles in the Origin of the Reptiles
a.1 Absence of Convincing Fin-to-Limb Fossils (The ever-mysterious origin of the tetrapods.) (e.g.; coelacanths are now discounted, but new fossil candidates are reported regularly.)
a.2 Absence of Amphibian-Reptile Transition Fossils
a.3 Evidence for Polyphyletic Origin of Reptiles

BREb Great Age of Reptiles (i.e.; 340 million years)

BREc Origin of Crocodiles is Murky and Controverted

BREd Origin of Turtles and Relationship to Other Reptiles Is Poorly Understood (The first fossil turtles already have shells and major features of modern turtles.)

BREe Puzzle of the Ichthyosaurs
e.1 Why Did Reptiles Return to the Sea?
e.2 How Did Their Fish-Like Fins and Huge Eyeballs Evolve?

BREf Origin of the "Mammal-Like" Reptiles [BRUe]

BREg Pterosaur Origin Called "Unaccountable"
g.1 How Did Flight Originate in Reptiles? [BATj, BBT13, BMA41]
g.2 Pterosaurs First Appear as Highly Specialized and Flight-Capable in the Fossil Record

Several now-extinct reptiles, such as Pterodactylus, developed flight. Today, only a few lizards and snakes can glide clumsily. [BREg]

BREh Dinosaur Fossils with Feather-Like Structures [See also BBEb]

BREi Dinosaur Fossils Found in Both Polar Regions (How did vegetarian dinosaurs survive the long dark nights?)

BREj Evidence for both Hot- and Cold-Blooded Dinosaurs (They may have had four-chambered hearts.)

BREk Puzzles in the Origin of Snakes
- k.1 How Were Legs Lost and Present Terrestrial Forms of Motion Evolved?
- k.2 Did Terrestrial Snakes Evolve from Sea Snakes or Vice Versa?
- k.3 No Common Ancestor for Snakes and Lizards
- k.4 Whence the Large Number of Vertebrae?
- k.5 How Did the Complex Swallowing Capability Develop?
- k.6 How and Why Did So many Different Types of Venom Evolve? [BRCd]

BREl How Did the Dinosaurs Become Extinct? (Evidence for many scenarios exists, several of which may have been operative.)
- 1.1 Asteroid Impact
- 1.2 Eruption of Flood Basalts and Climatic Effects
- 1.3 Extreme Climate Changes
- 1.4 Thinning of Atmosphere
- 1.5 Nearby Supernova
- 1.6 Disease (e.g.; cancer, rickets)
- 1.7 Cyanide Poisoning

BREm Origin of the Dinosaurs Still Controverted

BREn Examples of Reptile Evolutionary Stasis (i.e.; the existence of "living fossils") (e.g.; turtles, crocodiles, Sphenodons)

BREo Some Dinosaurs and Lizards Were Ruminants

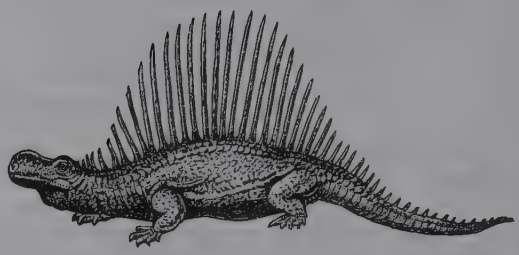
BREp Evidence Pro and Con that Dinosaurs Built Nests and Cared for Young Like Birds

BREq A Curious Connection between Dinosaur Feeding Behavior and the Origin of Flowering Plants

BREr The Mystery of the "Hand Animal" (It is presumed to be a huge reptile that left footprints like human handprints.)

BREs Fossils of Allosaurus in Both Europe and North America (But they supposedly originated after the continents separated.)

BREt Uncertainty about the Function of the Dorsal "Sails" on Some Dinosaurs



The purpose of the dorsal "sails" on many dinosaurs remains a puzzle. Could they have been heat exchangers? [BREt]

BREu Whale-Like Reptile Fossil Found in China [BREf]

BREv Some Dinosaurs Had Bird-Like Gizzards

BREw Tyrannosaurus rex and Other Large Carnivorous Reptiles May Have Killed by Poisoning Prey with Saliva (Their teeth had grooves to harbor bacteria like those of the modern Komodo dragon. Note that human bites are hardly sterile!)

BRF REPTILIAN BODILY FUNCTIONS

BRFa Promiscuous Female Snakes Store Sperm for Months While They Compete (Sperm wars again.) [BAFc]

BRFb Female Lizards Can Select Sperm to Enhance Offspring (How do they do this and what criteria are used?)

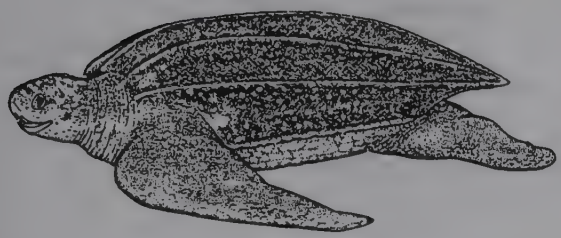
BRFc Survival of Winter Freezing (e.g.; painted turtles) [BACm, BFCd)

BRFd Incubating Python Warm-Blooded

BRFe Reptile Parthenogenesis (e.g.; whiptail lizards, some geckos) [BRAu]

BRFf Snake Ingestion of Large Prey (e.g.; python and Thomson's gazelle, even small humans) [BRBm]

BRFg Viviparous Reptiles (e.g.; many lizards and snakes, the Bougaineville skink can either lay eggs or deliver young alive)
BRFh Leatherback Turtles Are Warm-Blooded
BRFi Leatherback Turtles Carry Strange Balls of Wax in Their Intestines



Reptiles are usually cold-blooded, but the leatherback turtle is an exception. [BRFh]

BRFj Egg Temperature Determines Sex of Offspring (e.g.; alligators, crocodiles)
BRFk Some Turtles Breathe through Gills in Cloaca (e.g.; sea turtles, Fitzroy River turtle)
BRFl Some Marine Reptiles Excrete Salt Via Tears (e.g.; crocodiles, turtles, iguanas)
BRFm Plant-Eating Snakes (e.g.; tentacled snakes---purpose of its tentacles is unknown)
BRFn Reptiles Never Stop Growing (Like fish.) [BFFh, BMF])

BRG REPTILIAN GENETICS

BRGa Homology Fails in Reptile Phylogeny
a.1 Seemingly Identical Lizards on Pacific Islands Differ Genetically
a.2 Genetics Has Revolutionized Reptile Phylogenies Based upon Homology

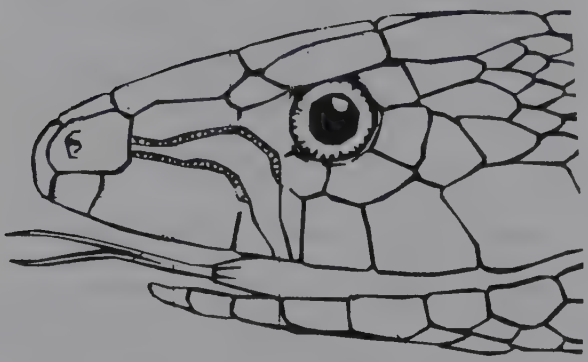
BRI INTERNAL SYSTEMS AND STRUCTURES OF REPTILES

BRIa Magnetite in Reptiles (e.g.; turtles)
BRIb Antibody Diversity Unusually Restricted in Reptiles
BRIc Turtle Skeletons Resemble Those of Mammals Rather Those of Reptiles

BRO ORGANS OF REPTILES

BROa Remarkable Parallel Evolution of Independently Movable Eyes (These eyes required major changes in musculature and information processing.) (e.g.; chameleons and sandlance)
BROb Unique Chameleon Eye Lenses Have Negative Refractive Power
BROc Lizard "Sunglasses" (i.e.; translucent lids in some Anoline lizards)
BROd Sea Iguanas Can Stop Their Hearts (By doing this sharks cannot locate them by sound or electrical activity.)
BROe Reptiles with Four-Chambered Hearts (e.g.; crocodiles, alligators, caimans, etc.; as do mammals and birds)
BROf Reptiles with Actively Controlled Heart Valves (e.g.; crocodiles, alligators, etc.)
BROg Most Snakes Have Fish-Type Eyes (Focussing is accomplished motion of the lens along the optical axis. In other reptiles, mammals, and birds, the lens shape is changed in focussing. The single, highly anomalous exception known: the long-nosed tree snake.)
BROh Some Snakes Possess Lymphatic Hearts
BROi Heat-Sensitive (Infrared-Sensitive) Organs in Snakes
i.1 On Lips (e.g.; boas and pythons)
i.2 Between Eyes and Nostrils (e.g.; pit vipers)
BROj Most Snakes Possess Only the Right Lung

BROk Vipers with Round Pupils (e.g.; Causus) (All other snakes have slit pupils.)



Most snakes possess vertical, slit-like pupils but a few, like the grass snakes, have round pupils. Why? (New Scientist, p. 85, December 11, 1999.) [BROk]

BRT UNUSUAL TALENTS AND CAPABILITIES OF REPTILES

BRTa Turtle Navigational Feats [BBT12, BMT2]
- a.1 Japan to Baja California, 10,000 kilometers (e.g.; loggerhead turtles)
- a.2 Several Circuits around Sargasso Sea between Nestings (e.g.; loggerhead turtles)
- a.3 Females Find the Same Beaches Where They Were Born (e.g.; many sea turtles)
- a.4 Green-Turtle Navigation to Ascension Island (10 kilometers wide, 2,200 kilometers from Feeding Area in Brazilian Waters

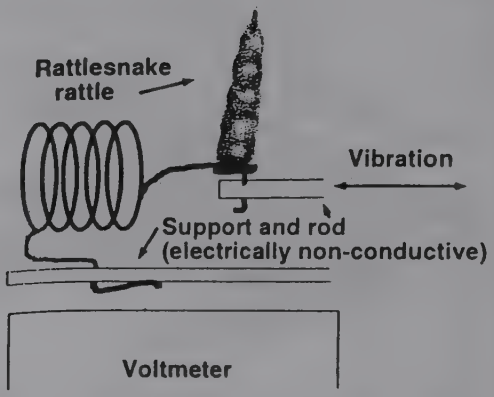
BRTb Why Did Green Turtles Choose Remote Ascension Island for Nesting?

BRTc Existence of Long, Narrow Turtle Migration Corridors (How and why are these narrow bands used? What determines their geometry?) (e.g.; leatherback turtles)

BRTd Many Sea Turtles Possess a Magnetic Senses [BMTi]

BRTe Some Lizards Perform Well in Homing Experiments [BBT5, BFTf, BHT18, BRTi, BSTb]

BRTf Existence of an Electrostatic Sense in Some Snakes (e.g.; rattlesnakes)



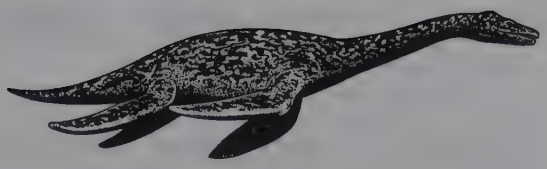
Rattlesnakes can not only detect electrostatic fields but they can also generate them with their rattles, as discovered in the experiment shown. Exactly how these capabilities are employed is still a mystery. (Nature, 370:184, 1994.) [BRTe]

The matamata is a 3-feet-long turtle from South America. The leaf-like growths on its neck and head camouflage it among the leaves. These growths, however, are also sensitive vibration detectors that permit the nearly-blind turtle to close in on its prey. [BRT]

BRTg Lizards Possess Photosensors in addition to Normal Eyes and the Parietal Eye
BRTh Reptile Sound Generation
h.1 Geckos Are Only Lizards Capable of Vocalizing
h.2 Anecdote of "Hissing Conversation" among a Group of Snakes
h.3 Anecdotes of "Singing" Alligators
BRTi Snake Homing Capabilities (e.g.; striped whipsnakes) [BRTe]
BRTj Observations Suggest Snakes Sense Impending Earthquakes
BRTk Remarkable Diving Capabilities (e.g.; leatherback turtles, 3000 feet, 2-hour duration) [BMT7]

BRU UNRECOGNIZED REPTILES

BRUa Claims for a Loch Ness Monster
BRUb Claims for Large Dinosaur-Like Reptiles (i.e.; "Mokele-Mbembe," in Africa, another in New Guinea)
BRUc Claims for Large Fresh-Water Reptiles [BMU11]
c.1 Lake Okanagan Monster a.k.a. "Ogopogo"
c.2 Chesapeake Bay Monster, a.k.a. "Chessie"
c.3 Lake Champlain Monster, a.k.a. "Champ"
c.4 Lake Erie Monster
c.5 Lake Manitoba Monster, a.k.a. "Manipogo"
c.6 Lake Memphremagog Monster, a.k.a. "Memphre"
c.7 Lake No, Africa, a.k.a. the "Lau"
c.8 And Others Less Well Known
BRUd Claims for Large Marine Reptiles Characterized as "Sea Serpents" [BMU11]
d.1 The Famous Often-Seen "New England Sea Serpent" of the 1800s
d.2 Claims of a Sea Monster off Northwestern Canada, a.k.a. "Cadborosaurus" or "Caddy"
d.3 Hundreds of Observations of "The Great Sea Serpent" or "The Norwegian Sea Serpent"
BRUe Claims for a Giant Amphibious Reptile in Australia, a.k.a. "The Bunyip"
BRUf Worldwide Claims and Legends of Giant Flying Reptiles, a.k.a. "Thunderbirds"
BRUg Claims of a Giant Underground Reptile in South America, a.k.a. "The Minhocao"
BRUh Claims of Giant Turtles Seen at Sea (i.e.; 40 feet long)
BRUi Claims of an Alpine Two-Legged Lizard, a.k.a. "The Tatzelwurm" (Similar animal claimed for Japan.)
BRUj Claims for an Unrecognized Reptilian in the Himalayas a.k.a. "The Buru"



Some cryptozoologists believe that the plesiosaur still survives and accounts for some of the many sea-serpent reports. [BRUd]

BRX REPTILE INTERFACES WITH OTHER ANIMALS

BRXa Animal Hypnotism
a.1 Humans Charming Snakes [BHX2]
a.2 Snakes Charming Birds [BBX3]
BRXb Mutually Beneficial Interfaces
b.1 Spur-Winged Plovers and Nile Crocodiles (i.e.; plovers pick leeches from crocodiles' mouths, crocodiles deter predators of plovers nesting nearby)
b.2 Sharp-Beaked Ground Finches and Marine Iguanas on the Galapagos (i.e.; finches remove parasites from iguanas)

BS AMPHIBIANS[25]

BSA EXTERNAL APPEARANCE AND MORPHOLOGY
BSB UNUSUAL AMPHIBIAN BEHAVIOR
BSC AMPHIBIAN BIOCHEMISTRY
BSD AMPHIBIAN DISTRIBUTION IN SPACE AND TIME
BSE THE FOSSIL RECORD OF AMPHIBIANS
BSF AMPHIBIAN BODILY FUNCTIONS
BSG AMPHIBIAN GENETICS
BSI INTERNAL STRUCTURES OF AMPHIBIANS
BSO AMPHIBIAN ORGANS
BST UNUSUAL AMPHIBIAN TALENTS AND CAPABILITIES
BSX CURIOUS INTERFACES BETWEEN AMPHIBIANS AND OTHER SPECIES

Frogs and toads are the most familiar of the amphibians. Almost everyone has seen them at one time or another. Few, however, have searched under dead leaves or waded in shallow ponds looking for salamanders---a second kind of amphibian. The third major group of amphibians, the caecilians or "glass snakes," inhabit the soil and litter of tropical forests are seen mainly by scientists deliberately searching for them.

The most important biological characteristic of the amphibians is their progress from egg through a laval stage to their adult form. For vertebrates, these stages of metamorphosis are profound in their physiological, biochemical, and behavioral changes. Usually, but not always, a fish-like, water-dwelling animal converts to an air-breathing, terrestrial tetrapod.

Amphibians also exhibit some other features worth highlighting at the beginning:

- Some frogs can glide through the air by virtue of their broad, extended feet;
- Some frogs can synthesize potent, chemically complex poisons;
- Groups of frogs will engage in synchronized singing;
- Frogs and toads are "living fossils," having changed little in hundreds of millions of years;
- The males of at least one frog species broods its eggs in its stomach (i.e.; gastric brooding);
- A few amphibians "nurse" their young; frogs may feed their tadpoles infertile eggs; caecilians provide nutritious secretions;
- Some amphibian eyes are sensitive to the geomagnetic field;
- Frogs have been shown to have a homing ability;
- Many frogs communicate via ground vibrations as well as sound; and
- The caecilians have evolved "hydrodynamic" propulsion as a way to move through their environment.

BSA EXTERNAL APPEARANCE AND MORPHOLOGY

BSAa The Existence of Many Populations of Unisexual Salamanders (These animals are not parthenogenetic, their eggs are stimulated but not fertilized by sperm from closely related species.) [BFFf, BRAu]

BSAb Seemingly Superficial, Exaggerated Male Features Attract Females and (Surprisingly) Lead to Superior Offspring (One would anticipate that grossly distorted features would reduce survivability.) (e.g.; tree frogs)

BSAc Remarkable Changes from Larval to Adult Forms (e.g.; salamanders) [BSAr]
- c.1 Population Mix of Forms Depends upon Environmental Conditions
- c.2 The Axolotl Changes Back to Juvenile Form If Conditions So Dictate

BSAd Salamander Cannibalist Morphs Prey Mainly on Other Species in Neighborhood (This implies kin recognition of some kind.)

BSAe Existence of Giant Salamanders
- e.1 North American Hellbender, 29 Inches Long
- e.2 Some Asian Species, 5½ Feet Long

BSAf Some Salamanders Possess Ballistic Tongues (Like chameleons.)

BSAg Ability to Change Color (e.g.; some tree toads) [BRAa]

BSAh Tadpoles Develop Different Body Shapes Depending upon Predators Observed Nearby

BSAi Gliding Frogs with Aerofoil Feet (This capability developed several times in frogs on various continents.) [BATn, BFTk, BMT5, BRAf]

BSAj Parallel Evolution in South American and Australian Frogs (e.g.; Leptodactylus)

BSAk Claim of Inheritance of Acquired Characteristics (The famous case of the midwife toad; the "Kammerer story")

BSAl Some Salamanders Possess Hollow Fangs for Injecting Females with Aphrodisiacs

BSAm Ribs of Sharp-Ribbed Salamander May Protrude through Skin (Spine-like, they may deter predators.)

BSAn The "Hairy Frog" Has Filaments that Act as Accessory Gills

BSAo Incubating Frogs and Toads
- o.1 Surinam Toad (Male pushes eggs into spongy structure on female's back, lid then forms over them.)
- o.2 Australia's "Marsupial Frog" (Tadpoles push into pouches on male's flanks.)

BSAp Hydrodynamic Propulsion (i.e.; caecilians, which are mostly bags of fluid, have girdles of muscles that squeeze the body forward through the soil.)

BSAq Male Newts Lack Penis (Instead, a spermatophore is somehow transferred, as in spiders.)

BSAr Metamorphosis of Tadpoles into Frogs and Toads Requires

The physiologically profound metamorphosis of a tadpole to adult frog. (But not all frogs go through the tadpole stage!) [BSAc]

Immense, Poorly Understood Morphological and Systemic Changes [BSCa]

One of the several tree frogs capable of modest gliding adventures. [BSAi]

BSB UNUSUAL AMPHIBIAN BEHAVIOR

BSBa Presence of a Predator Causes Tree-Frog Embryos to Hatch (They then drop to safety in water below.)

BSBb Remarkable Convergence of Behavior in Distantly Related Toxic Frogs (e.g.; South American poison-dart frogs and Australian Mantella frogs)

BSBc Anecdote of Frogs Congregating to Listen to Human Music [BMB10, BMX2]

BSBd Pair-Bonding and Biparental Care of Offspring (Very rare and unexpected in amphibians.) (e.g.; the Dendrohatidae frogs)

BSBe Frog Battles (In an anecdote from Malaysia, 1970, over 3,000 frogs of four species engaged in a 6-hour battle.)

BSBf Right-Pawedness in Toads (This suggests brain lateralization thought to be limited to more "advanced" animals.)

BSBg Anecdotes of Toads Consuming Red-Hot Charcoal and Lighted Cigarettes

BSBh Desert-Dwelling Frogs Develop Cocoon to Conserve Water (To accomplish this, they shed a layer of epidermis.)

BSBi Anecdote of Bullfrog Eating Domestic Chicks (Bullfrogs also consume wild birds, see BBX2.)

BSBj Frog Choruses (i.e.; synchronized singing) (e.g. Rana sylvatica) [BABn, BBT21]

BSBk Horned Toad Squirts Blood from Eyes When Disturbed

BSBl Intrauterine Cannibalism (i.e.; embryos eat each other befor live births) (e.g.; black Alpine salamander) [BFBa]

BSBm South African "Rain Frog" Cannot Swim (This subterranean species inflates itself when dropped in water and floats to safety.)

BSC AMPHIBIAN BIOCHEMISTRY

BSCa Convergence in Poison Manufacture

a.1 TTX or Tetrodotoxin, a Small Molecule with a Unique Cage Structure, Is Found in Frogs, Toads, Fish, Starfish Octopuses. (Was this chemica synthesis invented independently or the consequence of inheriting the same genes?)

a.2 Homobatrachotoxin, a More Complex Molecule Is Found in Poison-Dart Frogs and Pitohuis, a Group of New Guinea Birds.

BSCb Poison-Dart Frogs Lose Their Toxicity in Captivity (Such loss suggests that they manufacture the poison from chemicals in their natural food---a remarkable talent.)

BSCc Toad and Newt Eggs Are Toxic

BSCd Erythrocyte (Red-Blood-Cell) Curiosities

d.1 Amphibians Have Ovoid or Elliptical Erythrocytes Like Camels [BMC1, BMC6]

d.2 Some Salamanders Have Unnucleated Erythrocytes Like Some Mammals (Human erythrocytes are nucleated when first formed, but the

nuclei and mitochondria are "squeezed" out.) [BMCe]

BSCe Molecular Studies Closely Link Salamanders and Caecilians, with Frogs Being the More Distant (This is contrary to taxonomy based on morphology.)

BSCf Remarkable Biochemical Changes during Metamorphosis
f.1 Tadpole Nitrogen Excretion Change from 90% Ammonia to 90% Urea
f.2 Tadpole Hemoglobin Changes to Frog Hemoglobin

BSD AMPHIBIAN DISTRIBUTION IN SPACE AND TIME

BSDa Marked Scarcity of Frogs in Southeast Asia Compared to Similar Regions of Central America (Density ratio less than 1:10.)

BSDb Hard-to-Explain Spottiness of Amphibian Geographical Distribution. Two from Many Examples Follow.
b.1 Caecilians Are Found Mexico-to-Peru, in Tropical Africa, and East Indies
b.2 Frog Family Liopelmidae: Only in New Zealand, Northwestern North America

BSDc Claims of Living Amphibians Entombed in Solid Rock, Wood, Old Masonry Walls, etc. (Hundreds of anecdotes exist. See ESB8.)

BSDd Anecdotes of Plagues and Mass Invasions of Frogs or Toads

BSDe Anecdotes of Live Frogs or Toads Falling from the Sky (Scores of accounts in the literature. See GWF11.)

BSDf Historical Decline of Frog and Toad Populations (i.e.; this phenomenon is recent, precipitous, and largely unexplained.)

BSDg Blind Amphibians in Aquifers over 100 Feet Deep (The subterranean blind salamanders little resemble surface-dwelling salamanders.)

BSE THE FOSSIL RECORD OF AMPHIBIANS

BSEa Few Convincing Fish-Amphibian Transitional Fossils Exist (There were many profound changes: limbs---the "tetrapod problem;"---lungs; vital organs; metamorphosis. The lungfish has some amphibian characteristics but is still a fish.) [BREa]

BSEb Some Fossils Blur Distinction between Amphibians and Reptiles

BSEc The Sudden Appearance of about a Dozen Orders of Amphibians in the Fossil Record about 350 Million Years Ago (Many of these orders seem non-ancestral.)

BSEd Living Fossils (Fossil frogs 190-million years old are almost identical to modern jumping frogs.)

BSEe Fossil Record Is Essentially Nonexistent for the Caecilians (the So-Called "Glass Snakes")

BSF AMPHIBIAN BODILY FUNCTIONS

BSFa Remarkable Incubation and Brooding Methods
a.1 Mouth Brooding (i.e.; in

The male Surinam toad incubates eggs in special pouches on its back. The evolutionary scenario for this brooding technique must be very interesting! [BSFa]

"vocal pouches," Rhinoderma darwini)
a.2 Gastric (Stomach) Brooding (e.g.; Australian Rheobatrachus silus)
a.3 Cutaneous Brooding [BSAo] (e.g.; in pouches, Gastrotheca cornuta; stuck on back, Strafania evansi)

BSFb Viviparous Frogs (e.g.; New Guinea's Nectophyrmoides accidentalis)

BSFc Frogs Omitting the Tadpole Stage (e.g.; Cogui frogs)

BSFd Parental Care in Amphibians
d.1 Transportation to Better Habitats (e.g. poison-dart frogs)
d.2 Provision of Infertile Eggs for Food (e.g.; poison-dart frogs)
d.3 Provision of Nutritious Secretions (e.g.; caecilians)

BSFe The Many Poorly Understood Changes during Amphibian Metamorphosis
e.1 Long Vegetarian Gut to Short Carnivorous Gut
e.2 Programmed Death ("Apoptosis") of Many Features (e.g.; tadpole tails)
e.3 Development of Many New Features (e.g.; limbs)
e.4 Thin Permeable Skin to Thick Impermeable Skin
e.5 Gills to Lungs
e.6 Biochemical Changes (See BSCf.)

BSFf Survival of Freezing Temperatures (e.g.; many frogs and salamanders) [BFEd]

BSFg Regeneration Capabilities of Amphibians Much Greater Than in Humans (e.g.; newt's eyes, salamander limbs and spinal cord)

BSFh Foot-Breathing (i.e.; arboreal salamanders)

BSFi Newt Metabolism Rate Correlated with Moon's Position

BSFj Incongruously, Giant Tadpoles Metamorphosize into Tiny Frogs

BSFk Sex Changes, Female to Male (e.g.; African reed frog)

BSFl Homologous Structures Develop from Different Parts of Embryo (e.g.; newt arms from segments 9-11, human arms from segments 13-18)

BSG AMPHIBIAN GENETICS

BSGa Salamanders in Western North America Have Several Times More DNA Than Their Eastern Close Relatives

BSGb A Single Gene Controls Whether the Axoltol (a Salamander) Becomes Terrestrial or Stays in Aquatic Larval Form

BSGc mtDNA Jumps between Closely Related European Frogs

The axoltol, a salamander, often lives out its life in this aquatic larval form, breathing through its feathery, external gills. [BSGb]

BSI INTERNAL STRUCTURES OF AMPHIBIANS

BSIa Vertebrate Body Plan (Including Amphibians) Resembles That of an Upside-Down Insect

BSIb Unusual Opisthocoelous Vertebr (Concavities Located Behind) Found in Distantly Related Amphibians (e.g.; European fire-bellied toad, Surinam toad, midwife toad, painted frog, and---uniquely among fish---the North American garpike.)

BSO AMPHIBIAN ORGANS

BSOa Modern Frogs and Toads Seem Degenerate in Skull Bones, Teeth, Vertebrae

BSOb Blind Amphibians Develop Eyes in Lighted Environment

BSOc Frogs' Eyes and Brains Do Not Respond to Stationary Objects

BSOd Homology Failure in Amphibia (If the optic cup of a Rana fusca embryo is removed, no lens will develop; not so with closely related Rana esculents, the "edible" frog.)

BSOe Some Amphibian Ears Are Sound Generators (e.g.; bullfrogs)

BSOf Earless Frogs Hear via Their Lungs (e.g.; Panamanian golden frog)

BSOg Some Amphibian Eyes Sense the Geomagnetic Field (e.g.; eastern red-spotted newt) (Actually, the visual pigments in the vertebrate eye are suspected of being magentosensors in many other animals.)

BSOh Light-Sensitive Skin Sets Circadian Clocks in Some Amphibians (e.g.; African horned frog)

BSOi Some Salamanders are Lungless (e.g.; Plethodontidae family)

BST UNUSUAL AMPHIBIAN TALENTS AND CAPABILITIES

BSTa Toad Tadpoles Differentiate between Siblings and Non-siblings Even Though Reared Separately (e.g.; Bufo americanus)

BSTb Homing Abilities of Amphibians [BHT18, BMT2, BRTi]

b.1 Newts (1-2½ Miles) (e.g.; Taricha rivularis) [BSOg]

b.2 Bullfrogs Return to Points of Capture

b.3 Toads to Overwintering Sites (e.g.; Bufo hemiophyrys)

BSTc Giant African Bullfrogs Plow Channels Allowing Their Tadpoles to Escape Shrinking Ponds

BSTd Vibratory (Seismic) Communication in Amphibians (e.g.; Puerto Rican white-lipped frogs, Malayasian tree frogs) [BATs, BMT9]

BSX CURIOUS INTERFACES BETWEEN AMPHIBIANS AND OTHER SPECIES

BSXa Anecdotes of Live Amphibians Found in Human Stomachs (e.g.; bullfrog, salamander) [BSFa]

C CHEMISTRY & PHYSICS

CA CHEMICAL REACTIONS
CB MAGNETISM
CC CONSTANTS OF NATURE
CE THERMODYNAMICS
CF NATURAL FORCES
CK SOLID-STATE PHYSICS
CN NUCLEAR PHYSICS
CO SELF-ORGANIZING PHENOMENA
CP SUBATOMIC PARTICLES
CQ QUANTUM MECHANICS
CR RELATIVITY
CS CLASSICAL PHYSICS
CT PHENOMENA OF FLUIDS
CZ MISCELLANEOUS PHYSICS

PRIMARY SCIENCE SOURCES EXAMINED IN CHEMISTRY AND PHYSICS *

American Journal of Physics (60 vols.)
Optical Society of America, Journal (67 vols.)
Physics Today (55 vols.)

*Obviously, most of the information in this chapter has come from the general-science periodicals, such as Nature and Science.

CA CHEMICAL REACTIONS

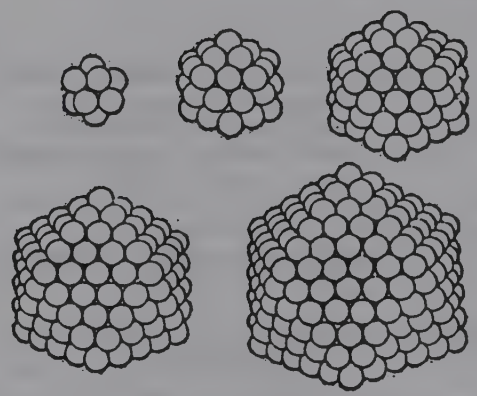
CAC UNUSUAL CHEMICAL SPECIES
CAH EXTREMELY DILUTE SOLUTIONS
CAS CLAIMED EXTRATERRESTRIAL INFLUENCES UPON CHEMICAL REACTIONS
CAW CHEMICAL WAVES AND OSCILLATIONS
CAX MISCELLANEOUS CHEMICAL PHENOMENA

CAC UNUSUAL CHEMICAL SPECIES

CACa Some Interesting Noble-Gas Compounds (e.g.; Xe-C)
CACb Red Mercury (This is a long-rumored exotic explosive. Formula not in the literature surveyed!)
CACc Existence of Stable Calcium Ions (They have 3 electrons in their outer shells.)
CACd Unusual Chemical Compounds
d.1 Compounds with 5 Nitrogen Bonds
d.2 Supercharged Hydrogen (It possesses 3 electrons.) electrons)
d.3 Existence of Heavy Natural Ozone (Given the naturally occurring distribution of O^{16}, O^{17}, and O^{18}, some ozone is $3O^{18}$.)
d.4 Strangely Twisted Molecules (e.g.; ethane)
CACe Quasicrystals (e.g.; decadonal $Al_{72}Ni_{20}Co_8$, which forms curious solids)
CACf Large Molecular Clusters (e.g.; (Mo_{248}, Pd_{145}) (Some of these clusters possess "magic" numbers of atoms.)

CAH EXTREMELY DILUTE SOLUTIONS

CAHa Favorable Clinical Trials of Homeopathic Solutions [PPGn]
CAHb The Strange Politics of Homeopathy



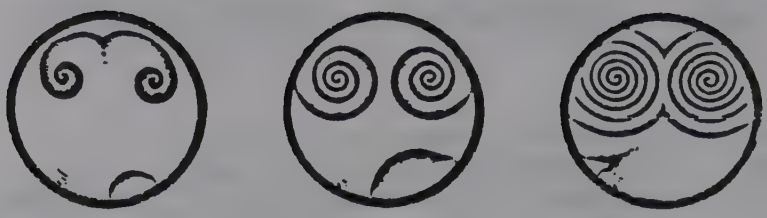
Krypton atoms cluster together in stable clumps of 13, 55, 147, 309, 561 atoms, etc. Such specific numbers are termed "magic." (New Scientist, p. 31, March 3, 1990.) [CACf]

CAS CLAIMED EXTRATERRESTIAL INFLUENCES UPON CHEMICAL REACTIONS

CASa Piccardi Effect (The claimed solar effect on the speed of chemical reactions.)
CASb An Apparent Solar Influence on Storage-Battery Capacity

CAW CHEMICAL WAVES AND OSCILLATIONS

CAWa Belousov-Zhabotinsky Reactions [CAWd]
CAWb Liesegang Phenomena (e.g.; gels that rhythmically swell and contract)
CAWc Oscillating Chemical Systems



Spectacular, evolving waves of chemical activity propagate through a receptive liquid medium in the Belousov-Zhabotinskii reaction. (American Scientist, 75: 252, 1987.) [CAWa]

(e.g.; silver nitrate forms concentric rings of gels)

CAWd Spiral Waves in Biochemical Reactions (e.g.; aggregating slime molds) [CAWa]

CAX MISCELLANEOUS CHEMICAL PHENOMENA

CAXa Magnetic Field Affects Some Reaction Rates (e.g.; the reduction of hematite)

CAXb Even-Odd Carbon-Atom Disparity (In a survey of 7 million organic compounds, even carbon-atom numbers strongly outnumbered odd.)

CAXc Remarkable Polymer Motion (i.e.; slithering, snake-like motion to "escape" physical restrictions)

CAXd Problems in Explaining the Origin of the Elements after the Hypothesized Big Bang (The heavy elements in particular.)

CAXe Atomic Memory (The surprising recovery of initial conditions after decay into disorder.)

CAXf Unexplained, Spontaneous Heat Bursts in Frozen Hydrogen [CNF]

CAXg Darwinian Chemistry ("Mutant" molecules fight to survive.)

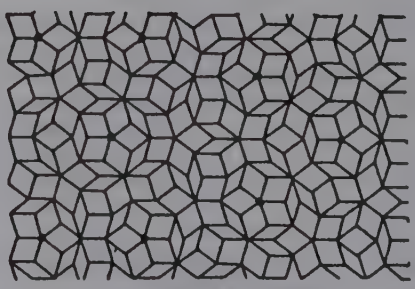
CAXh Claims of Unusual Weight Changes in Some Chemical Reactions (From experiments in 1901!)

CAXi Mechanical Energy Affects Chemical Reaction Rates (Ball mills sometimes may substitute for chemical accelerants.)

CAXj Five-Fold Symmetry in Liquids (Liquids have more order than commonly believed!)

CAXk Chirality-Amplifying Chemical Reactions (These might explain why biochemistry is chiral.)

CAXl Amazingly Complex Chemical Structure of Pores (e.g.; MOF-5, a metal-organic framework)



Five-fold symmetry (Penrose tiling) is seen in this two-dimensional quasi-periodic geometry. Such symmetry was once thought to be impossible in nature. (Science News, 127:188, 1985.) [CAXj]

CB MAGNETISM

CBM PROBLEMATICAL MONOPOLES
CBO ORIGINS AND PUZZLES OF MAGNETISM
CBR MAGNETIC RADIATION
CBX MISCELLANEOUS MAGNETIC PHENOMENA

CBM PROBLEMATICAL MONOPOLES

CBMA Many Claims of Monopole Sightings [CBXd]
CBMb Catalyzation of Proton Decay by Monopoles [CPP]
CBMc Suggestion That the Universe Is a Single, Giant Monopole

CBO ORIGINS AND PUZZLES OF MAGNETISM

CBOa Examples of Spontaneous Magnetization
CBOb Gyromagnetism (RRM = Rotational Remanent Magnetism)
CBOc Magnets of Organic Materials [CBOf]
CBOd "Ghost" Magnetization (Occurs in magnetic materials in which there is a dearth of micromagnets, which are supposedly the basis of magnetism.)
CBOe Generation of Magnetic Fields by the Rotation of Mass (Blackett's famous, now-discarded hypothesis. He used the sun as his model.)
CBOf Carbon Magnets [CBOc]

CBR MAGNETIC RADIATION

CBRa Reichenbach's Experiments (Old claim regarding the luminosity of magnets.)

CBX MISCELLANEOUS MAGNETIC PHENOMENA

CBXa Spontaneous Loss of Magnetism
CBXb Claims of the Effect of Magnetization upon Mass
CBXc Stable Magnetic Levitation
CBXd Possible Existence of Magnetic "Charge" [CBM]
CBXe Magnetism of Small Atomic Clusters (e.g.; clusters of less then 60 rhodium atoms unexpectedly become strongly ferromagnetic.)

CC CONSTANTS OF NATURE

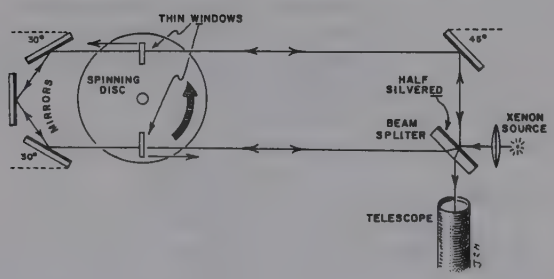
CCC SPEED OF LIGHT
CCE CHARGE ON THE ELECTRON
CCG GRAVITATIONAL CONSTANT
CCI INTERRELATIONSHIPS AMONG FUNDAMENTAL CONSTANTS
CCL FINE-STRUCTURE CONSTANT
CCZ OTHER INTERESTING NATURAL CONSTANTS

CCC SPEED OF LIGHT

CCCa Faster-than-Light Claims
- a.1 Tunneling Photons Seen in Laboratory
- a.2 Superluminal Astronomical Objects [AWBh]
- a.3 Possible Existence of Tachyons (i.e.; faster-than-light particles) [CPT]

CCCb Claimed Historical Decay of the Speed of Light [CCCd]

CCCc Possible Variability of the Speed of Light
- c.1 Direct Observations in the Laboratory
- c.2 Varying Speed of Light (VSL) Theory (This theory obviously denies a Special Relativity postulate.)



In the diagrammed 1962 experiment, the velocity of light was not independent of the motion of the source, violating one of Einstein's postulates. (New Scientist, 16:276, 1962.) [CCCc]

CCCd Claimed Historical Increase in the Speed of Light [CCCb]

CCCe Stopping Light in Laboratory Experiments (Nonanomalous)

CCE CHARGE ON THE ELECTRON

CCEa Nonconservation of Charge (Speculations that electric charge can be destroyed.)

CCEb Fractional Charge Measurements (i.e.; as in the quantum Hall Effect) [CPE, CPQ]

CCG GRAVITATIONAL CONSTANT

CCGa Theoretical Speculations about the Variability of G (the Constant of Gravitation)

CCGb Inaccuracy of Current Measurements of the Gravitational Constant, G [CFG]

CCGc "Fifth Force" Experiments [See CFF]

CCGd Anomalous Phenomena Involving the Gravitational Constant [CFG]

CCI INTERRELATIONSHIPS AMONG FUNDAMENTAL CONSTANTS

CCIa Curious Numerical Relationships among the Fundamental Constants (There are many.)

CCIb Dirac's Large-Number Hypothesis

CCIc General Variability of Physical Constants [CCC, CCG, CCL]

CCId Proton-Electron Mass Ratio Relationship
CCIe Curious Numerological Relationships among Particle Masses

CCL FINE-STRUCTURE CONSTANT

CCLa Variability Measurements [CCIc]
CCLb Numerical Coincidences Involving the Fine-Structure Constant [CCIa]
CCLc Is the Fine-Structure Constant Really an Exact Fraction?

CCZ OTHER INTERESTING NATURAL CONSTANTS

CCZa The "Comma of Pythagoras" (Occurs in music theory.)
CCZb The Golden Mean (or Ratio) = 1.61803.... (A ubiquitous number in nature.)

CE THERMODYNAMICS

CES SECOND-LAW CHALLENGES
CEX MISCELLANEOUS TOPICS IN THERMODYNAMICS

CES SECOND-LAW CHALLENGES

CESa Violations of Second Law; (e.g.; reversed entropy, the possible reality of Maxwell's Demon)

CESb Particle Self-Organization (i.e.; the spontaneous creation of order) [COK]

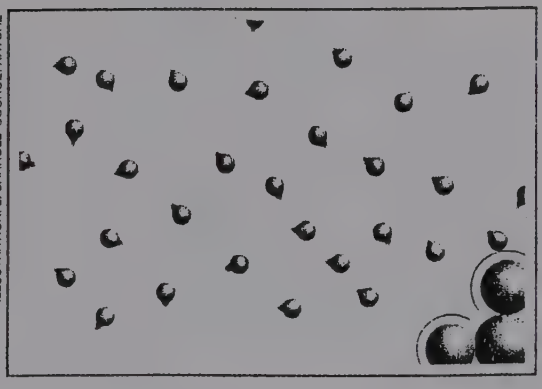


ILLUSTRATION: L. CARROLL SOURCE: *NATURE*

When many smaller spheres are added to a system of larger spheres, the "gentle force" of entropy "pushes" the latter into a corner and a state of higher order. (Science, 279:1849, 1998.) (CESb]

CEX MISCELLANEOUS TOPICS IN THERMODYNAMICS

CEXa Challenges to Brownian Movement Theory

CEXb Freezing of Hot Water Phenomenon

CEXc Violations of the Third Law of Thermodynamics (The Kauzmann Paradox.)

CEXd Heat Conduction Anomalies (Conduction involves more than the classical diffusion of heat.))

CEXe Laboratory Examples of Heat Flowing from Cold to Hot

CEXf Claims of Spontaneous Heat Generation (Reich-Einstein Experiment)

CF NATURAL FORCES

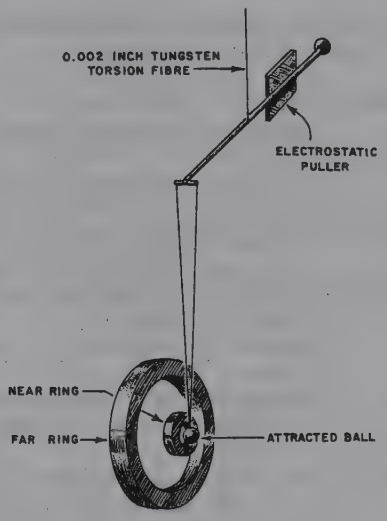
CFC CENTRIFUGAL FORCE
CFF "FIFTH FORCES" (DEVIATIONS FROM NEWTON'S LAW)
CFG GRAVITY
CFM MORPHOGENIC FIELDS
CFR UNIVERSAL REPULSIVE FORCE (HYPERFORCE)
CFS A UNIVERSAL ATTRACTIVE FORCE (SIXTH FORCE)
CFX MISCELLANEOUS FORCE PHENOMENA

CFC CENTRIFUGAL FORCE

CFCa Theoretical Reversal of Centrifugal Force near Black Holes

CFF "FIFTH FORCES" (DEVIATIONS FROM NEWTON'S LAW)

CFFa Geophysical Experimental Data (e.g.; data from mines, ice-bore holes)
CFFb Laboratory Experiments (e.g.; Eotvos-balance experiments)
CFFc Anomalous Gravitational Phenomena [See CFG.]
CFFd Gravitational Constant Measurements [CCGb]



The pictured apparatus seemed to show that Newton's inverse square law breaks down at very small distances. (Nature, 260:417, 1976.) [CFGc]

CFG GRAVITY

CFGa Gravitational-Wave Experiments (Past failures, future hopes.)
CFGb Dependence of Gravitational Force upon Different Materials (There have been many experiments, especially those of C.F. Brush.)
CFGc Validity of Inverse-Square Law (e.g.; many experiments)
CFGd Claims of Periodicities in the Gravitational Force (i.e.; Bagby's data) [GGFb]
CFGe Speculations about the Speed of Gravity (Many believe it is infinite.)
CFGf Antigravity Experiments (e.g.; anomalous data from gyroscope experiments)
CFGg Claims for the Existence of Gravitational Charge (i.e.; "gravitons")
CFGh Supergravity (i.e.; from quantum theory)
CFGi Kinetic Theory of Gravitation (i.e.; Brush experiments) [CFGb]
CFGj Fifth Force [See CFFa, CFFb]
CFGk Gravitational Constant [See CCG.]

CFM MORPHOGENIC FIELDS

CFMa Experimental Evidence (i.e.; from many Sheldrake ex-

periments) [CFMb]

CFMb Debunking Papers and Books Are Rife

CFR UNIVERSAL REPULSIVE FORCE (HYPERFORCE)

CFRa Observations That the Universe Is Expanding Faster Than Current Theory Allows [ATBb]

CFS A UNIVERSAL ATTRACTIVE FORCE (SIXTH FORCE)

CFSa Experimental Observations Made from Towers

CFX MISCELLANEOUS FORCES

CFXa Solar Eclipses Affect Pendulums [ASX6]

CFXb Heavier Objects May Fall Faster (Speculation based upon postulated increase of mass with temperature.)

CFXc Potential Breakdown of Force Laws

CFXd Interaction of Gravitational and Electromagnetic Fields [CRGg]

CFXe The Action Lagrangian (A proposed universal force law.)

CFXf The Autonomous Field (i.e.; forces as event-regulators)

CFXg Casimir Force [CQVd]

CFXh How Are Forces-at-a-Distance Exerted on Macroscopic Masses? (A philosophical query!)

CK SOLID-STATE PHYSICS

CKT SUPERCONDUCTIVITY
CKX MISCELLANEOUS SOLID-STATE PHENOMENA

CKT SUPERCONDUCTIVITY

CKTa Examples of High-Temperature Superconducting Materials
CKTb Theories of Superconductivity
b.1 General Theories Applied at Very Low Temperatures
b.2 Theories of High-Temperature Superconductivity
CKTc Organic Superconductors
CKTd Powdered Superconductors (e.g.; platinum)
CKTe Balls of Superconductor Particles Created by the Application of Electric Fields
CKTf Oddities of Condensed-Matter Physics (e.g.; the strange behavior of specific heat in metal compounds)
CKTg Electron Ballistic Flight through Solids

CKX MISCELLANEOUS SOLID-STATE PHENOMENA

CKXa Magnetic Levitation by Superconductors (They repel magnets.)
CKXb Perpetual Electric Currents Induced in Gold Rings at Low Temperatures
CKXc Observations of Orbital Waves in Solids
CKXd Seething Motion of Some Solid Surfaces
CKXe Electrical Capacitance Changed by Magnetic Fields (e.g.; in glass)
CKXf Electron Interference Patterns on Cold Metal Surfaces

CN NUCLEAR PHYSICS

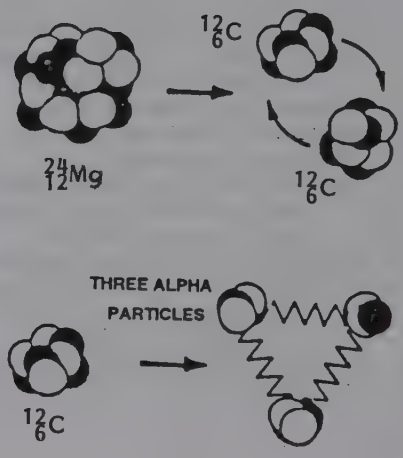
CND RADIOMETRIC DATING
CNF COLD FUSION
CNN NUCLEAR PHENOMENA
CNR RADIOACTIVITY ANOMALIES
CNS UNUSUAL SCATTERING PHENOMENA
CNX MISCELLANEOUS NUCLEAR PHENOMENA

CND RADIOMETRIC DATING

CNDa Basic Assumptions and Possible Error Sources [ESP12]
CNDb Radiocarbon Erroneous Dates (e.g.; ages of subfossil trees)
CNDc Uranium-Series Erroneous Dates (e.g.; human bones)
CNDd Potassium-Argon Erroneous Dates (e.g.; volcanic rock)

CNF COLD FUSION

CNFa Pro and Con Experiments (A surprising number of "pro" experiments in off-mainstream publications.)
CNFb Cold-Fusion Politics
CNFc Some of the Many Cold-Fusion Theories
CNFd Claim for "Warm" Fusion (i.e.; over 1,000°K but far below thermonuclear temperatures)



Possible "nuclear-molecular" forms of magnesium-24 (top) and carbon-12 (bottom). (New Scientist, p. 21, April 6, 1991.) [CNNg]

CNN NUCLEAR PHENOMENA

CNNa Superheavy Nuclei (i.e.; atomic weights over 500)
CNNb Nuclear Structural Anomalies
CNNc Neutron Halos around Nuclei
CNNd "Demon" Nuclei and Quark Clusters
CNNe Distorted Nuclei (These spin Rapidly and are highly deformed) [CNNi]
CNNf Naturally-Occurring Trans-Uranium Elements (e.g.; element-108)
CNNg "Molecular" Structure of Nuclei (e.g.; ^{24}Mg as two ^{12}C atoms rotating about a common center)
CNNh Islands of Stability (Especially, the Magic Element with 184 neutrons and 114 protons.)
CNNi Spinning Nuclei [CNNe]
CNNj Fusion via Sonoluminescence [CSZx]
CNNk Strange Nuclei (i.e.; with exotic particles, such as lamdas)
CNNl Anomalously Large Nuclear Fragments (Called "anomalons," they have very short mean free paths.)
CNNm Doubly Magic Nuclei (e.g.; nitrogen-48)
CNNn "Ordinary" Magic Nuclei (e.g.; numbers 13, 55, 147, etc)
CNNo Chirality of Nuclei (i.e.; left-

and right-hand versions)

CNNp "Star Events" in Nuclei (i.e.; spectacular spontaneous explosions of nuclei)

CNR RADIOACTIVITY ANOMALIES

CNRa Effects of Pressure, Temperature, etc. on Decay Rates

CNRb Nonrandom Decay Rates

CNRc Effect of Chemical State upon Decay Rate (e.g.; in Be^7)

CNRd Some Apparently Variable Decay Constants

CNRe Exotic Decay Schemes (e.g.; twin-proton decay)

CNRf Anomalous Radiohalos (Giant halos suggest unrecognized types of radioactivity.)

CNS UNUSUAL SCATTERING PHENOMENA

CNSa Unexplained Observations in High-Energy Scattering Experiments (e.g.; possible quark substructures)

CNX MISCELLANEOUS NUCLEAR PHENOMENA

CNXa Charge-Parity (CP) Violation in Atoms

CNXb Chernobyl Phenomena (The reactor core essentially vanished.)

CNXc Strange Matter (e.g.; the H dibaryon) [CPZh]

CNXd Cold Fission (^7Li is one of several candidates.)

CNXe Anomalous Transmutation of Elements (e.g.; Kervran's experiments) [BBCa]

CO SELF-ORGANIZING PHENOMENA

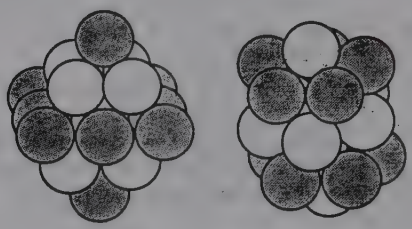
COC CRYSTALS
COK CLUSTERS
COS SELF-REPLICATING PHENOMENA

COC CRYSTALS

COCa Crystal-Like Aggregations of Ultrafine Gold Particles)
COCb Snowflake Growth Poorly Understood (Possible electrostatic forces.)
COCc Helical Crystals (e.g.; manganese oxide)
COCd Violent Self-Destruction of Some Protein Crystals
COCe Oscillations in Crystal Growth
COCf Quasicrystals (i.e.; icosahedral solids, five-fold symmetry)
COCg Bizarre and Unexpected Crystals (e.g.; erbium-mercury)
COCh Anomalous Crystals (i.e.; crystals with dimensions at odds with theory) (e.g.; $TaSe_2$)
COCi Space-Grown Crystals (They are much larger then those grown on earth.)
COCj Whiskers
COCk Amorphous Ice
COCl Crystals with Multiple Periodicities (e.g.; barium IV)
COCm Crystallization via Clusters
COCn Interference Pattern of Buckeyballs
COCo Crystal Shape Change under Illumination (e.g.; diarylethene)
COCp Crystal Inclusions [See ESC13-X16, ESC16-X4, ESI11.]
COCq Crystal Phantoms [See ESI1.]
COCr Crystalline Nanotubes and Wires
COCs Orbitons (i.e.; waves and quasiparticles within crystals)

COK CLUSTERS

COKa Spontaneous Formation of Crystal Clusters (e.g.; as in gold tiles)
COKb Clusters of Particles (e.g.; molybdenum)



Clusters of 19 niobium atoms can exist in two stable forms. The "chocolate" form (right) reacts readily with hydrogen, while the "vanilla" form (left) does not. (Science, 248:1186, 1990.) [COKb]

COKc Crystal-Like Structure in Liquids (Cubic structure observed in microemulsions.)
COKd Spontaneous Formation of Noble-Gas Clusters (e.g.; krypton in magic-number clusters of 13, 55, 147,..)
COKe Spontaneous Assembly of Molecules in Patterns (e.g.; double-helical supramolecules)
COKf Spontaneously Aligned Nanocrystals
COKg Polymer Folding Coordinated by Ions (e.g.; polymers and zinc ions) (Protein folding is aided by "chaperon" molecules.)
COKh Quasicrystals [COCf]

COS SELF-REPLICATING PHENOMENA

COSa Self-Replicating Molecules (e.g.; some peptides)

CP SUBATOMIC PARTICLES

CPA ANOMALONS
CPC PHOTONS
CPE ELECTRONS
CPN NEUTRINOS
CPP PROTONS
CPQ QUARKS
CPT TACHYONS
CPU NEUTRONS
CPX PROBLEMATICAL SUBATOMIC PARTICLES
CPZ PARTICLE THEORY AND ASSOCIATED TOPICS

CPA ANOMALONS

CPAa Anomalons (i.e.; nuclear fragments that react unusually strongly with matter) [CNN1]

CPC PHOTONS

CPCa Evidence that Photons Possess Mass
CPCb Hypothesized Nonexistence of Photons
CPCc Tachyons [see CPT]

CPE ELECTRONS

CPEa Existence of Heavy Electrons (i.e.; muons, taus, and possibly others)
CPEb Electrons in Metals Seem Behave as If They Are More Massive (i.e.; their "effective" mass is greater)
CPEc Splitting of Electrons (They apparently are not fundamental particles. Their pieces are called "electrinos.")
CPEd Anomalous Electron Motion (e.g.; elliptical orbits)

CPN NEUTRINOS

CPNa Measurements Implying That Neutrinos Possess Mass
CPNb Observations of Neutrino Flipping (They change type spontaneously.) [ASF3, CPNh]
CPNc Anomalous Observations
c.1 Kaon-Decay Asymmetry
c.2 Unidentified Light Neutral Particle
c.3 Pion Production at Low Velocities
c.4 Anomalous Neutrino Cascades
c.5 New Force Signalled by Neutrino Shortage
CPNd Faster-Than-Light Neutrinos
CPNe Neutrino Olbers's Paradox
CPNf Truly Massive Neutrinos
CPNg Excess Electron-Neutrinos in CERN Experiment
CPNh Solar-Neutrino Deficiency [ASF3, CPNb]
CPNi Tau Neutrino Discovery
CPNj Use of Neutrinos for Inter-Galactic Signalling

CPP PROTONS

CPPa Mysterious Internal Structure (Its internal charge distribution conflicts with the magnetic field.)
CPPb Magnetic-Moment Discrepancy
CPPc Instability and Potential Decay (Decay predicted but not yet observed.) [CPXf]
CPPd Origin of Proton Spin Anomaly
CPPe Anomalously High Mobility of Hydrated Protons

CPQ QUARKS

CPQa Possible Divisibility into Other Particles (Gleeks)
CPQb Free Quarks
CPQc Possible Fractional Electric

Charge [CCEb, CPEc]
CPQd Quarks May Be Different in Different Elements! (e.g.; as in iron and deuterium)
CPQe Apparent Nonexistence of Quarks in Some Experiments
CPQf Quark Spins Are Insufficient in Protons and Neutrons
CPQg "Strange" Quarks [CPXk]

CPT TACHYONS

CPTa Existence of Tachyons (i.e.; faster-than-light particles) [CCC, CPCc]

CPU NEUTRONS

CPUa Possible Existence of Spin
CPUb Neutron Half-Life Measurements
CPUc Neutrons Bound in Quantum States by Gravitation
CPUd Aharonov-Casher Effect (i.e.; neutrons affected by electric field)
CPUe Neutrons Have Slight Negative Charge at Surface, But Positive at Center

CPX PROBLEMATICAL SUB-ATOMIC PARTICLES

CPXa Unnamed Anomalous Particles (Many, many of these)
CPXb Zeta (Z^0) Particles
CPXc Axions (Predicted but never detected.)
CPXd Photinos (Predicted by supersymmetry.)
CPXe Higgs Particles (They are held to be the source of mass.)
CPXf Decay of Antiprotons Detected [CPPc]
CPXg Demon Deuterons (Consisting of three pairs of quarks rather than two triplets.)
CPXh Squarks (i.e.; supersymmetric partners of quarks)
CPXi WIMPS (i.e.; weakly interacting massive particles)
CPXj Gluons: Nuclear Force-Carrying Particles
CPXk Lambda Particles (These include "strange" quarks.) [CPQg]
CPXl Charge-Parity Violations
CPXm Muon Magnetic Moment (Once claimed and now rejected.)
CPXn Cygnets (i.e.; strange cosmic-ray particles from constellation Cygnus)
CPXo Wimpzillas (These are speculative superheavy WIMPS---billions of times heavier.)
CPXp Anomalons [CNNl, CPAa]

CPZ PARTICLE THEORY AND ASSOCIATED TOPICS

CPZa Challenges to and Defenses of the Standard Model
CPZb Curious Polarization of the Classical Atom
CPZc Lack of Antimatter in the Universe [ATF8]
CPZd String Theory
CPZe Symmetry, Asymmetry, Supersymmetry
CPZf Antimatter Obeys Different Laws Than Ordinary Matter
CPZg Unknown Source of Mass [CPXe]
CPZh Strange Matter [CNXc]
CPZi Theories of Everything
CPZj Lee-Wick Matter (Hypothetical form of matter much more dense than ordinary matter.)
CPZk Reality of Particles Questioned

CQ QUANTUM MECHANICS

CQE ENTANGLEMENT PHENOMENA
CQI INTERFERENCE PHENOMENA
CQV QUANTUM-VACUUM PHENOMENA
CQW QUANTUM THEORY
CQZ MISCELLANEOUS EXPERIMENTS INVOLVING QUANTUM MECHANICS

CQE ENTANGLEMENT PHENOMENA

CQEa Bell Inequality and Einstein-Podolsky-Rosen (EPR) Paradox (And their "spooky" consequences.)
CQEb Entanglement Experiments (The promise of instantaneous communication and teleportation.)

CQI INTERFERENCE PHENOMENA

CQIa Two-Slit Experiments (Including beams of particles, such as C^{60}.)
CQIb Single-Photon Interference Experiments (Delayed-choice experiments.)
CQIc Tests of Uncertainty Experiment (i.e.; the effects of quantum entanglement)

CQV QUANTUM-VACUUM PHENOMENA

CQVa Detection of Quantum Fluctuations
CQVb Emergence of Matter from the Quantum Vacuum
CQVc Zero-Point-Energy Theory
CQVd Casimir-Force Measurements [CFXg]

CQW QUANTUM THEORY

CQWa Philosophy and Practical Meaning (If Any) of Quantum Mechanics (e.g.; the many-universe interpretation)
CQWb Quantum Mechanics Interface with Classical Physics
CQWc Quantum Mechanics Interface with Relativity
CQWd The Schrodinger's-Cat Thought Experiment and Others
CQWe Paradoxes of the Uncertainty Principle

CQZ MISCELLANEOUS EXPERIMENTS INVOLVING QUANTUM MECHANICS

CQZa Test of Superposition Theorem
CQZb Why Is Chaos Missing in Quantum Mechanics?
CQZc Anomalous Electric-Current Flow (Two currents flow in opposite directions in the same conductor.)
CQZd Memory in Quantum-Mechanical Systems (The Fermi-Pasta-Ulam recurrence.)
CQZe Quantum-Zeno Effect (The observer's suppression of phenomena, as in "a watched pot never boils.")
CQZf Aharonov-Bohm Effect (A magnetic field can affect electrons without touching them.)
CQZg Quantized Hall Effect (Hall resistance in quantized.)
CQZh Test of Hidden-Variables Hypothesis (Negative, so far.)
CQZi Quantum Imaging (Seeing without Looking!)
CQZj Violations of Pauli Exclusion Principle
CQZk Anomalous Spectra of Two-Electron Atoms
CQZl Quantum "Mirages" (Nonexistent atoms revealed!)
CQZm Quantum Mechanics and Time Warps (i.e.; worm holes) [CRGi]

CR RELATIVITY

CRE ETHER-DRIFT EXPERIMENTS
CRG GENERAL THEORY OF RELATIVITY
CRS SPECIAL THEORY OF RELATIVITY

CRE ETHER-DRIFT EXPERIMENTS

CREa Dayton Miller Experiment and Other Nonreplications of the Michelson-Morley Experiment
CREb Michelson-Morley Experiment and Replications
CREc Unipolar-Induction Tests of the Special Theory and the Existence of Ether
CREd Sagnac-Type Experiments with Ring Interferometers (Special Relativity contradicted.)
CREe Astronomical Tests for Ether

CRG GENERAL THEORY OF RELATIVITY

CRGa Cavendish Experiment Challenges General Relativity
CRGb Light-Deflection Experiments
CRGc Gravitation and Frequency Shifts (i.e.; gravitational redshifts)
CRGd Naked-Singularities Problem in General Relativity
CRGe Experimental Confirmations of General Relativity
CRGf DI Herculis Observations Challenge General Relativity [AOX1]
CRGg Interaction of Gravitational and Electromagnetic Fields [CFXd]
CRGh Other Explanations of Mercury's Perihelion Advance (i.e.; solar oblateness) [AHB1, ASO6]
CRGi Time Warps and Worm Holes [CQZm]
CRGj Time Reversibility
CRGk Time Asymmetry and "Time's Arrow"
CRGl Tests of the Principle of Equivalence (i.e.; equivalence of gravitational and inertial mass)
CRGm Incompatability of General Relativity and Quantum Mechanics

CRS SPECIAL THEORY OF RELATIVITY

CRSa Dingle's (Ignored) Critique and Other Objections
CRSb Experimental Proof of the Second Postulate (i.e. the constancy of the speed of light) [CCC]
CRSc Experiments Confirming the Special Theory
CRSd Confronting the Twin Paradox
CRSe Marinov's Campaign against Special Relativity
CRSf Anomalies in Lorentz's Force Law

CS CLASSICAL PHYSICS

CSZ MISCELLANEOUS CURIOUS PHENOMENA

CSZ MISCELLANEOUS CURIOUS PHENOMENA

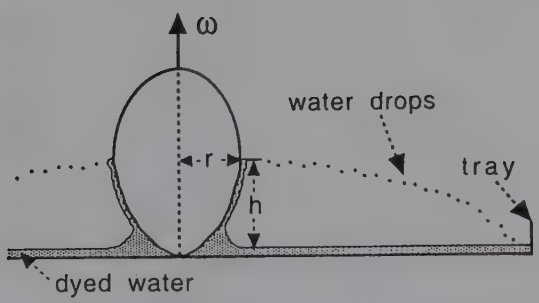
CSZa Pasta Breakage Phenomena
CSZb The Paradox of Apple Piles
CSZc Chaos in Tilt-a-Whirls
CSZd Oscillating Grapes in Soda Water (or Champagne)
CSZe Chaos in Pendulum Motion
CSZf Hour-Glass Problems (i.e.; sand chugging)
CSZg Amusing Phenomena Assuming Negative Masses
CSZh Detection of Mass Variations in the Laboratory
CSZi What Really Makes Ice So Slippery?
CSZj Chaos in Water Faucets
CSZk Dust and Breath Figures
CSZl Puzzle of Rupert's Drops (i.e.; explosions of glass drops)
CSZm Like-Charged Colloid Particles Attract Rather Than Repel
CSZn Ships Are Substantially Lighter When Sailing East (i.e.; the effect of centrifugal force)
CSZo Puzzling Shrinkage of Railroad Rails with Time
CSZp Annual Fluctuations in Quartz Clocks
CSZq Meridional Deviation of Falling Bodies
CSZr Unexpected Interaction between Light Beams (They attract one another under certain conditions.)
CSZs Shuddering of Spinning Coins
CSZt Optical Phenomena with Negative Indices of Refraction
CSZu Dynamics of Tumbling Buttered Toast
CSZv Redshifts Created in the Laboratory (Spectra change as light travels through space.)
CSZw The Brazil-Nut Effect (i.e.; ascension of larger objects in mixtures)
CSZx Sonoluminescence [CNNj]
CSZy Old Fiddles Sound Sweeter

CT PHENOMENA OF FLUIDS

CTZ MISCELLANEOUS FLUID PHENOMENA

CTZ MISCELLANEOUS FLUID PHENOMENA

CTZa Glassy Water
CTZb Superfluid Phenomena
CTZc Quantized Rotation in Superfluids
CTZd Fluid Solidification in Electric Field
CTZe Bizarre Fluid Flow Phenomena (e.g.; flow up onto spinning eggs)
CTZf Unusual Phase Transitions between Liquid States (Some liquids have several liquid phases. Even water is thought to have a low-density phase.)



A hard-boiled egg (or a like-shaped solid) spinning in a layer of water draws water up the sides and creates a sprinkler effect. (Curious, but non-anomalous, of course.) (American Journal of Physics, 66:442, 1998.) [CTZe or even CSZ]

CZ MISCELLANEOUS PHYSICS

CZP PHILOSOPHICAL ASPECTS OF SCIENCE
CZZ SOME "BIGGER" PICTURES SEEN BY SCIENCE

CZP PHILOSOPHICAL ASPECTS OF SCIENCE

CZPa Role of Fate in the Cosmos
CZPb Frauds in Science
CZPc Humor in Science
CZPd Science Police and Science Politics (e.g.; the infamous Clovis Police in archeology)
CZPe Role of Serendipity in Scientific Discovery
CZPf Science Philosophy
CZPg The Limits of Science and Human Knowledge
CZPh Science and Religion Interface
CZPi Science and Mysticism Interface
CZPj Transcendent Experiences in Science
CZPk Anthropic Principle (The idea that the universe is made for humans or is accidently temporarily suitable.)
CZPl Tacit Knowledge
CZPm Possibility that Infrahumans Have Existed. Now Exist, or Will in the Future
CZPn Existence of a Nonsupernatural Creative Force in Nature (It could not be spookier than quantum mechanics.)
CZPo Anomalists, Mavericks, and Heretics in Science
CZPp Scientific Objectivity (Examples of its occasional absence.)
CZPq The Skeptics Movement

CZZ SOME "BIGGER" PICTURES SEEN BY SCIENCE

CZZa Optical-Sieve Phenomena
CZZb Mass as a Fifth Dimension
CZZc Critical Experiments That Have Never Been Reproduced
CZZd Symmetry in the Laws of Nature (Does it exist?)
CZZe Dynamical Chaos
CZZf Politics and Philosophy of Science [see CZP]
CZZg Consequences of Negative Probabilities
CZZh A Magnetic Model of Matter
CZZi Spin and Twist in Nature
CZZj Shadow Matter (This exists in a shadow world consistent with superstring theory. We feel only its gravitational effects.)
CZZk The Possibility of Hidden Spatial Dimensions (i.e.; real multiverses)
CZZl Significance (If Any) of Coincidences [XKC]
CZZm Consequences of Negative Time
CZZn Claim that Randomness Is the Basis of Reality
CZZo A Universe without the Time Dimension
CZZp Active Information (The speculation that information is the foundation of reality, rather than mass, distance, etc.)
CZZq Mirror Matter (Another term for "shadow matter.") [ATGd, CZZj]

E GEOLOGY

EC CHEMICAL AND PHYSICAL ANOMALIES OF INNER EARTH
EQ SEISMIC PROBING OF INNER EARTH
ES STRATIGRAPHIC ANOMALIES
ET TOPOGRAPHIC ANOMALIES
EW GEOLOGY AND CLIMATE
EZ THE GEOMAGNETIC FIELD AND PALEOMAGNETISM [GEZ]

PRIMARY SCIENCE SOURCES EXAMINED IN GEOLOGY

American Association of Petroleum Geologists, Bulletin (81 vols.)
American Geologist (35 vols.)
Earth Science (35 vols.)
Earth Science Reviews (24 vols.)
Geographical Journal (143 vols.)
Geographical Magazine (55 vols.)
Geographical Review (67 vols.)
Geological Magazine (114 vols.)
Geological Society of America, Bulletin (112 vols.)
Geological Society of London, Quarterly Journal (133 vols.)
Geologists Association, Proceedings (81 vols.)
Geology (27 vols.)
Journal of Geology (110 vols.)
Journal of Glaciology (32 vols.)
Journal of Sedimentary Petrology (56 vols.)
Rocks & Minerals (75 vols.)

EC CHEMICAL AND PHYSICAL ANOMALIES OF INNER EARTH[12]

ECC CHEMICAL ANOMALIES OF INNER EARTH
ECD ANOMALIES DISCOVERED BY DEEP-DRILLING
ECG STRUCTURAL ANOMALIES INDICATED BY GRAVITATIONAL ANOMALIES
ECH HEAT-FLOW ANOMALIES

The purpose of this short section is the collection of chemical and physical anomalies that are not treated in sections EQ (seismological anomalies) and EZ (geomagnetic anomalies).

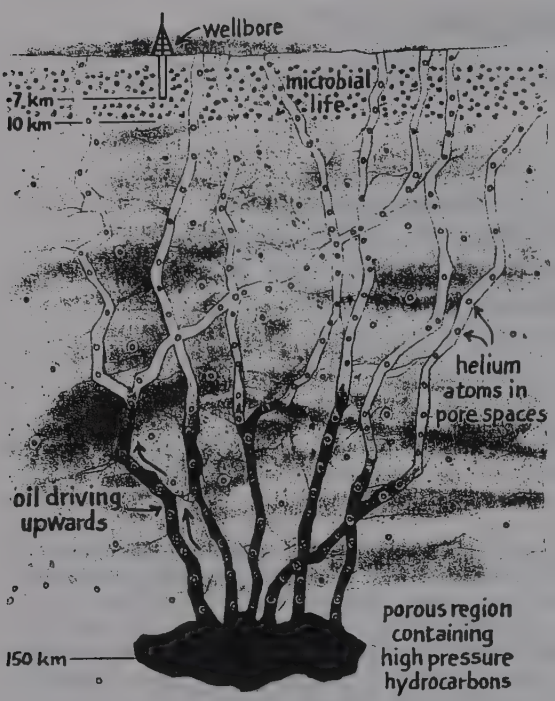
Our picture of the earth's interior is considerably enhanced by studying the gases emanating from the crust, the measurements of heat flow, and the varying strength of the gravitational field. Most helpful of all have been the discoveries of the deep-drilling programs. It turns out that the planet's crust is hotter and wetter than long believed. Heat flows more copiously than expected from mid-plate thermal plumes. Still unsolved is the large flux of helium-3 issuing from the earth's interior. Where does this supposedly primordial, noble-gas isotope come from?

ECC CHEMICAL ANOMALIES OF INNER EARTH

ECC1 Anomalous Abundances of Some Noble Gases (e.g., missing xenon, excess subterranean helium-3)
ECCa Global Methane Burps and Biological Extinctions
ECCb Apparent Periodicity of Helium-3 Emissions from Crust
ECCc Unknown Light Element in Core [EQDc]
ECCd Great Age Diversity in Mantle
ECCe Deeply Buried Water Bodies (Some bodies are hundreds of kilometers deep.)
ECCf Possible Liquid Carbon in Mantle
ECCg Chemical Anomalies Suggesting Much Crust Exists in Mantle
ECCh Enriched Plutonium and Uranium in Volcanic Samples
ECCi Core-Mantle Chemical Imbalance (Speculation that the earth is a giant battery?)
ECCj Anomalous Ages of Deep Zircon Samples
ECCk Hydrothermal Diamonds

ECD ANOMALIES DISCOVERED BY DEEP-DRILLING

ECD1 Drilling Truth Confounds Surface Science
1.1 Unexpected Temperature Profiles
1.2 Unexpected Density Profiles
1.3 Fractured Rocks with Circulating Fluids at Great Depths
1.4 Elusive Discontinuities and Reflectors
1.5 Encounters with Unexpected Rock Types
1.6 Anomalous Buried Magnetic Anomalies
1.7 Deep Forms of Life (Bacteria found at least 12 kilometers down.)
ECDa Recent Warming of Some Drill Holes



Undiscovered microbial life may exist kilometers below the surface. Such microbes may be the source of the biological molecules found in the otherwise abiotic oil seeping upward. (American Scientist, 85:408, 1997.) [ECD1]

ECG STRUCTURAL ANOMALIES INDICATED BY GRAVITATIONAL ANOMALIES

ECG1 Remarkable Gravity Anomalies (e.g.; The Great African Negative Anomaly) [ETBc]
ECG2 Gravity Trends That Challenge the Continent-Accretion Model
ECG3 Gravity Data Indicating Large Mantle Inhomogeneities
ECG4 Anomalous Gravity Signals Following Earthquakes (These are faint, long-period variations.)

ECH HEAT-FLOW ANOMALIES

ECH1 Unexpected Mid-Plate Volcanism
ECH2 Unusual Hot-Spot Tracks (e.g., the double nature of the Hawaiian chain)
ECH3 Dearth of Continental Hot Spots (A fact suggesting static continents.)
ECH4 Non-Random Distribution of Hot Spots (Two mid-latitude bands exist.)
ECH5 Thermal Plumes Correlated with Other Geophysical Activity (e.g.; biological extinctions) [ECHc, ESB]
ECHa Heat Sheets Instead of Plumes?
ECHb Possible Initiation of Continental Drift by Internal Heat Surge
ECHc Plume Activity Correlated with Magnetic Reversals [ECH5, EZP5]
ECHd Heat Surges Correlated with Oceanic Flooding
ECHe Lack of Frictional Heating at Faults
ECHf Effects of Internal Heat Flow upon Ocean Circulation
ECHg Curious Existence of Antipodal Hot-Spot Pairs
ECHh Antarctic Hot Spot and Possible Consequences on Ice Cover
ECHi Existence of Superplumes (e.g.; the Tahiti "superswell")
ECHj Earth's Core Is Anomalously Hot for Planet's Age
ECHk Anomalous Hot Spots and Heat Heat Flows (e.g., Many in the Pacific Basin)
ECHl Cretaceous-Tertiary Massive Eruptions (e.g.; India's Deccan Traps
ECHm Unknown Cause of Cyclic Volcanism
ECHn Thermal Anomalies Preceding Earthquakes

EQ SEISMIC PROBING OF INNER EARTH[12]

EQA SEISMIC PROBING OF INNER EARTH
EQD SEISMIC DETECTION OF LARGE-SCALE STRUCTURES, ZONES, DISCONTINUITIES
EQQ ANOMALOUS SEISMIC SIGNALS

A most productive way of obtaining information about the earth's interior is simply listening to the sounds it makes. Such natural scrapings and groanings can be supplemented by artificial sounds, such as explosions. Inner earth, it seems, harbors a panoply of intriguing sound-velocity discontinuities, seismic reflectors, convection cells, and mysterious, unidentifiable structures. More specifically, geophysicists infer:

- A "crystalline" core;
- The existence of "slow" earthquakes;
- Whole-earth "hums";
- Deep-focus earthquakes (600 kilometers deep); and
- The deep penetration of subducted slabs.

EQA SEISMIC PROBING OF INNER EARTH

EQA1	Unexpected Stratification of Basement Rocks
EQA2	Anomalously Deep Continental Roots (They penetrate the mantle.)
EQA3	Deep Penetration of Subducted Slabs (Some penetrate the core-mantle boundary.)
EQA4	Lateral Inhomogeneities in the Lower Mantle
EQA5	Mysterious Structures at the Core-Mantle Boundary
EQA6	Seismic Reflectors (These are horizontal plates in the lower crust 1-10 kilometers across.)
EQAa	Seismic Gaps (i.e.; areas where quakes of unexpectedly rare)
EQAb	Fossilized Thermal Plumes
EQAc	Existence of a Deep River of Flowing Rock
EQAd	Unknown Causes of the Breakup of Some Subducted Slabs
EQAe	Mantle-Current Effects on Plate Sizes
EQAf	Existence of Pockets of Ancient Crust within Continental Plates

EQD SEISMIC DETECTION OF LARGE-SCALE STRUCTURES, ZONES, DISCONTINUITIES

EQD1	Unexplained Velocity Discontinuities (e.g.; the 670-kilometer discontinuity)
EQD2	Unexplained Channels and Zones
EQD3	Structural Anomalies of the Inner Core (e.g., core departures from expected spherical shape) [EQDb]
EQD4	Anomalies Associated with Mantle Convection Cells (e.g.; lack of surface effects of convective cells)
EQDa	Fluid-Core Oscillations
EQDb	A "Crystalline" Core? [EQD3]
EQDc	Anomalously Low Core Density [ECCc]
EQDd	Unexplained Circulation of the Deep Mantle
EQDe	Core Differential Rotation (i.e.; relative to the mantle)
EQDf	Unidentified Inner-Core Inhomogeneities
EQDg	Evidence for a Tilted Core (i.e.; relative to the axis of rotation)
EQDh	Existence of Ultra-Low Velocity Zones

EQDi Evidence for Existence of an Ancient Conduit in the Mantle
EQDj High Electrical Conductivity of the Moho
EQDk Core Seismic Velocities Are Direction-Dependent

EQQ ANOMALOUS SEISMIC SIGNALS

EQQ1 Controverted Origin of Deep-Focus Earthquakes
EQQa Unexplained Seismic Signals and Events
EQQb Whole-Earth Hums [GSH, GSH5, GQVd]
EQQc Seismically Quiet Fault Zones
EQQd Miniblack Holes as Causes of Earthquakes
EQQe "Slow" Earthquakes [GQHa]
EQQf Seismic Signals Preceding Rockbursts
EQQg Seismic Surface-Resonances (As seen in the distant effects of some quakes.) [GQGb]

ES STRATIGRAPHIC ANOMALIES[10,11,12]

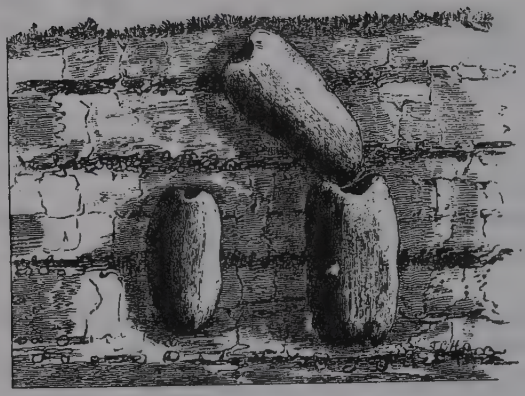
ESA	EMBEDDED ACCRETION STRUCTURES
ESB	ANOMALIES IN THE FOSSIL RECORD
ESC	ANOMALOUS CHEMICAL PHENOMENA IN GEOLOGY
ESD	DEPOSITS OF REMARKABLE SIZE
ESI	INCLUSIONS
ESM	ANOMALOUS SUPERFICIAL GEOLOGICAL MATERIALS
ESP	ANOMALOUS PHYSICAL PHENOMENA IN GEOLOGY
ESR	PHENOMENA OF THE OUTER CRUST
ESX	PIERCEMENT STRUCTURES, INTRUSIVES, EXTERNAL IMPRESSIONS

The outer crust of the earth is largely a multilayer sandwich of layers of solid rock, liquid water, ice, and an amazing variety of "debris fields." This miscellaneous "debris" derives from: extraterrestrial impacts (tektites); glaciers (the "drift"); volcanos (ash and long-runout undersea debris slides); and marine incursions (tsunami deposits). Admixed with these layers are such intriguing objects as bones, crystals, geodes, concretions, salt plugs, ore bodies, and sometimes immense deposits of oil and gas. In consequence, this section is a long one. It seems worthwhile to mention here some of the more interesting phenomena to follow:

- The frozen mammoths of Siberia;
- Oil-filled fossils and geodes;
- Immense gaps in the fossil record;
- Exceptionally large fossil deposits (bone beds and the South African Karoo Formation);
- "Death gulches";
- The controverted origin of ocean water;
- The cyclic nature of some coal deposits;
- Exotic boulders in coal beds and in extensive layers elsewhere;
- The stupendous deposits of methane hydrate;
- The anomalous sizes and shapes of the Muong Nong tektites;
- Multi-mile-long boulder trains;
- Mysterious sliding rocks (Racetrack Playa, California);
- Radiohalos of unknown provenance;
- Musical sands;
- Continental rocks in the ocean depths;

ESA EMBEDDED ACCRETION STRUCTURES

ESA1	Cylindrical Structures in Rock and Unconsolidated Sediments (e.g., massive sandstone pillars in Ontario gravel pit)
ESA2	Spherical Aggregates (e.g., ice balls, mud balls)
ESA3	Remarkable Concretions (e.g.; coal balls, sand spikes, shale balls in roofs of coal mines, ballstone)
ESA4	Small Fused Structures (e.g., pods of meta-anthracite)
ESA5	Geode Curiosities (e.g., oil-filled geodes)
ESA6	Orbicules (i.e., Concentrically layered structures in various rock matrices)
ESAa	Pseudomorphs (i.e., minerals that take on the crystalline shapes of other minerals)
ESAb	"Fairy Crosses" (Nonanomalous crystals, but interesting.)
ESAc	Unexplained "Texture" in Agate



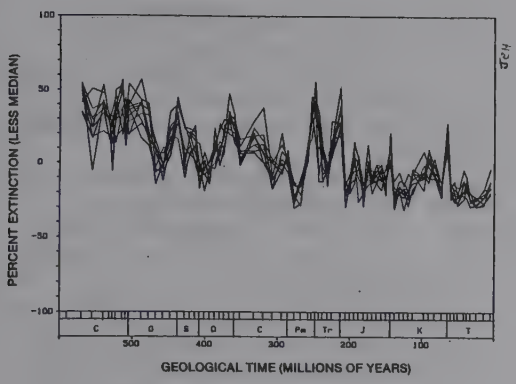
Three strange concretions ("paramoudras") and horizontal layers of flint in the Antrim chalk. (Victoria Institute, Journal of the Transactions, 26:209, 1892.) [ESA3]

ESAd Hourglass "Crystals" in Sand
ESAe Diamond Anomalies (Some may have a bacterial origin!)
ESAf Spod Logs (i.e., giant crystals ---up to 20 meters long!)
ESAg Origin of Carbonados (i.e., polycrystalline black diamonds)
ESAh Self-Organization in Nanocrystals

Several mace-shaped sand concretions from Mt. Signal Tower, California. The longest measures 28 inches. (Earth Science, 7:13, November-December 1954.) [ESA3]

ESB ANOMALIES IN THE FOSSIL RECORD

ESB1 Biological Extinction Events (e.g.; possible periodicity of extinctions) [EZP5]
ESB2 Biological Explosion Events; (e.g., Cambrian explosion)
ESB3 Recent Vegetation and Shallow-Water Fossils at Great Depths (e.g.; on the tops of deep guyots)
ESB4 Long-Buried, Undecomposed Organic Matter (e.g.; Siberia's frozen mammoths)
ESB5 Living and Fossil Marine Organisms Found Far Inland (e.g.; Lake Baikal seals)
ESB6 Living Organisms and Recent Fossils at Very High Altitudes (e.g.; recent marine fossils in the high Andes, indicating rapid uplift) [ETHc]
ESB7 Growth Structures on Marine Organisms and Their Fossils (e.g.; evidence suggesting changing number of days in the year)
ESB8 Animals Entombed in Solid Rocks (Hundreds of examples despite the phenomenon's seeming impossibility.)
ESB9 Living Organisms at Great Depths (Claims of live bacteria found in ancient strata, such as coal. Contamination usually the answer.)
ESB10 Fossils of Warm-Climate, Light Dependent Organisms Found in the Polar Regions (e.g.; trees, corals)
ESB11 Time-Wise Anomalous Fossils (i.e.; fossils much older or younger than enclosing strata)
ESB12 Skipping in the Fossil Record (The apparent reappearance of species either in the fossil record or real life. The fossil record is obviously incomplete.)
ESB13 "Special" Nature of Fossils (i.e.; the requirement for very rare special conditions for fossilization---conditions not seen today)
ESBa Common Orientation of Petrified Trees (The prostrate trees in Arizona's Petrified Forest have been linked to the blast that created Meteor Crater.)



Possible periodicity in the fossil record, as indicated by percent extinction for ten random groups of 1,000 genera. (Science, 241:26, 1988.) [ESB1]

ESBb Mixed Terrestrial and Marine Fossils in Same Deposits

ESBc Lack of Increasing Complexity of Fossils in Younger Strata (An example of evolutionary stasis.) [BFEb]

ESBd Biological Lithification (e.g.; bacterial action)

ESBe Bacterial Creation of Minerals (e.g.; placer gold, cave structures)

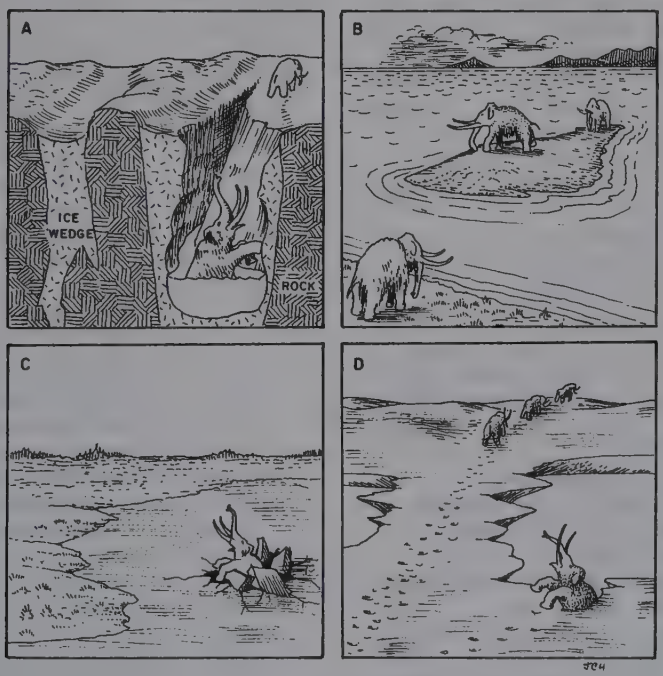
ESBf Dinosaur Bones in Bauxite (Bauxite is a metamorphic rock---hardly a fossil source.)

ESBg Puzzles in the Standard Geological Column and Fossil Record (i.e.; in terms of geographical distribution and absence of strata)

ESBh Origin and True Nature of Stromatolites

ESBi The Purported Ancient "Strangelove Ocean" (i.e.; the absence of all life)

ESBj Exceptional Fossil Concentrations (e.g.; the Karoo Formation, South Africa)



Four of the several noncatastrophic scenarios proposed to explain the frozen Siberian mammoths. (A) falling into an ice shaft; (B) starvation after being stranded by rising sea level; (C) falling through the ice; and (D) drowning when an eroding lake shore collapsed. (Smithsonian Magazine, 8:61, December 1977.) [ESB4]

ESC ANOMALOUS CHEMICAL PHENOMENA IN GEOLOGY

ESC1 Chemical Anomalies in the Stratigraphic Record (e.g.; carbon-isotope anomalies, iridium spikes)

ESC2 Chemical Anomalies in Igneous and Metamorphic Rocks

ESC3 Surface Films on Rocks (e.g.; desert varnish, desert glaze)

ESC4 Spontaneous, Rapid, Exothermic Reactions in Nature (e.g.; Smoking Hills, Arctic Canada)

ESC5 Death Gulches (e.g.; deadly gas pockets, Yellowstone Park, Wyoming)

ESC6 Violent Lake Turnovers (e.g.; Lakes Monoun and Nyos, Cameroon)

ESC7 Unusual Petrifactions and Lignifications (e.g.; the strange creations of petrifying springs)

ESC8 Geological Effects of Natural Combustion (e.g.; the creation of fusain or mother-of-coal)

ESC9 Rocks and Sediments of Controverted Origins (e.g.; banded iron, dolomite)

ESC10 Unusual Growth Structures (e.g.; ice spikes in bird baths)

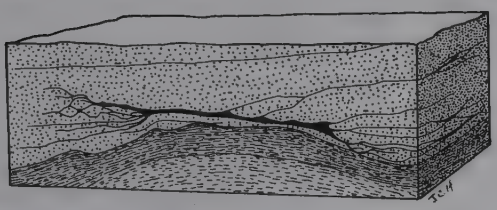
ESC11 Possible Extraterrestrial Origin of Ocean Water (i.e.; by comets) [GWC9]

ESC12 Chemical Anomalies of Lakes and Ground Water (Some northern inland lakes contain old trapped seawater.) (e.g.; Lake Tokke, Norway) [ESRa]

ESC13 Petroleum Anomalies
- 13.1 Conversion of Organic Material into Oil Poorly Understood
- 13.2 Odd-Carbon Predominance Less in Older Oils
- 13.3 Decline of Optical Activity in Older Oils
- 13.4 Carbon-13 Depletion of Oils
- 13.5 Natural Radioactive Oils
- 13.6 Hydrogen-Saturation of Oils
- 13.7 Commonality of Chemical Signatures in Oils
- 13.8 Presence of Bacteria in Oil
- 13.9 Unique Nature of Ordovician Oil
- 13.10 Chemical Affinities of Oil and Coal
- 13.11 Chemical Affinities of Oil and Volcanic Products
- 13.12 Existence of Non-Marine Petroleum
- 13.13 Organic Signatures Decrease in Older Oils
- 13.14 Occurrence of Oil in Crystals, Fossils, Basalt Vesicles
- 13.15 Indigenous Precambrian Petroleum (What lifeforms were the basis for it?)
- 13.16 Oil in Basement Rocks
- 13.17 Lack of Oil in Most Recent Sediments
- 13.18 Anomalous Composition of Oil in Recent Sediments
- 13.19 Geographical Association of Oil and Volcanos
- 13.20 Geographical Association of Oil and Crustal Defects
- 13.21 Association of Oil and Helium
- 13.22 Geographic Association of Oil and Coal
- 13.23 Oil Deposits Transcend Local Geology
- 13.24 Vertical Stacking of Hydrocarbon Deposits
- 13.25 General Cut-Off of Oil Deposits at 15,000 Feet
- 13.26 Oil Deposits in Deep-Sea Floors
- 13.27 Existence of Truly Giant Oil Fields
- 13.28 The Carbon Problem: Role of Petroleum [ESC9]
- 13.29 Oil-Migration Problem Remains Unsolved
- 13.30 Existence of Abundant Extraterrestrial Hydrocarbons

ESC14 Coal Anomalies
- 14.1 Frequent Absence of Vegetable Structure
- 14.2 Presence of Fusain (An abundant charcoal-like substance, also called "mother-of-coal.")
- 14.3 Presence of Rare Trace Elements (e.g.; gallium)
- 14.4 Presence of Excess Methane
- 14.5 Geographical Correlation of Coal with Oil
- 14.6 Association of Coal and "Fire Clays"
- 14.7 Presence of Marine Fossils
- 14.8 Most Coal Fossils Are

Replacement Fossils
14.9 Plant Fossils Atypical of Bogs and Marshes
14.10 Coal-Beds Horizontal over Immense Areas (i.e.; no quakes or other disturbances for millions of years)
14.11 Extreme Thicknesses of Some Coal Beds (e.g., 800 feet in Australia)
14.12 Great Areal Extent of Some Coal Beds (e.g., 15,000 square miles)
14.13 Cyclothems: The Cyclic Nature of Some Coal Formations
14.14 Lack of Necessary Overburden to Compress and Create Coal
14.15 Vein-Like, Intrusive Nature of Some Coal Deposits (e.g.; the Albert Coal of Canada)



Vein-like coal unlikely to have been formed by sedimentation. (American Journal of Science, 2:39:267, 1865.) [ESC14]

14.16 Unusually Low Mineral Content of Some Coals
14.17 Presence of Exotic Boulders on Coal Beds
14.18 Presence of Polystrate Structures (e.g.; tree fossils piercing several thick strata representing the long passage of time) (Why didn't the trees rot away in the millions of years?) [ESX1]
14.19 Lack of Coal Formation in Existing Peat Bogs
14.20 Rapid Creation of Synthetic Coal
14.21 Existence of Extraterrestrial Coal-Like Substances (e.g.; carbonaceous chondrites)

ESC15 Unexplained Intermittent Outgassing of Radon-222 from the Crust

ESC16 Methane Anomalies
16.1 The Missing Carbon problem [ESC16.5]
16.2 Carbon-Isotope Anomalies
16.3 Puzzle of Helium-Rich Methane
16.4 Methane Inclusions in Crystals and Magmatic Rocks
16.5 Extraordinary Size of Methane-Hydrate Deposits
16.6 Methane-Emitting Mud Volcanos
16.7 Methane around the Siljan Ring, Sweden, and Other Crustal Defects
16.8 Methane Emissions before and during Earthquakes (e.g.; a cause of unusual animal behavior) [BMT4]
16.9 Massive Methane-Hydrate Disintegration and Eruptions (These may have caused massive tsunamis, climate changes, and biological extinctions.)

ESCa Ubiquity of Fullerenes (e.g.; C^{60} in fulgerites, meteorites)

ESCb Apparently Anomalous Properties of Ganges Water (e.g.; antibacterial, curative action)

ESCc Bog Breathing (i.e., regular expansion and contraction of bog surface)

ESD DEPOSITS OF REMARKABLE SIZE

ESD1 Bone Caves, Bone Caches, and Other Superficial Accumulations of Bones (e.g.; the Ivory Islands, the La Brea Tar Pits)

ESD2 Bone Beds, Fish Beds, and Other Fossil-Rich Strata (e.g.; the immense diatom deposit, Lompoc, California)

ESD3 Sedimentary Deposits of Exceptional Volume (e.g.; Chinese loess, Arctic muck; the glacial drift)

ESD4 Historical and Legendary Evidence for Large-Scale Flooding

ESD5 Recent Large Reductions of Polar Ice Cover (e.g.;

records of Norse voyages, the Piri Re'is map apparently showing an ice-free Antarctica) [MGMb]

ESD6 Giant Basalt Flows and Traps (Indian Deccan Traps, Siberian basalt flows)

ESD7 Giant Accumulations of Oil (e.g.; Athabaska tar sands, Orinoco heavy-oil belt)

ESD8 Giant Erratics and Megabreccias (e.g.; Timor's Bobonaro Scaly Clay)

ESD9 Deposits of Great Areal Extent (e.g.; Pittsburgh coal beds, the Old Red Sandstone, many banded-iron deposits, the Karoo Formation, South Africa)

ESDa Massive Erosion Events (e.g.; 3-kilometer-deep Tertiary erosion. England)

ESI INCLUSIONS

ESI1 Inclusions in Crystals (e.g.; crystal phantoms) [ESA]

ESI2 Microdebris (e.g.; microtektites, spherules in greenstone belts)

ESI3 Erratic Boulders, Stones, and Mineral Patches in Sediments (e.g.; South Africa's boulder beds)

ESI4 Amber Anomalies
- 4.1 Immense Size of Amber Inclusions in the "Blue Earth" of East Prussia [ESMc]
- 4.2 Anomalous Mixture of Tropical and Temperate-Zone Insects Trapped in Amber

ESI5 Microfossil-Like Inclusions in Early Precambrian Rocks (These resemble cells and primitive lifeforms.) (e.g.; the Isua objects, 3.5 billion years old, from Greenland)

ESI6 Oil in Fossil Cavities (e.g.; Isua objects, Greenland)

ESI7 Carbon Dust on Fossil Plants

ESI8 Great Rarity of Meteorites and Tektites in Ancient Rocks [AYEh, ESM3]

ESI9 Stretched Pebbles (These are grossly deformed rocks.) (e.g.; in a Georgia conglomerate)

ESIa Possible WIMP Tracks and Pits (WIMPS = Weakly Interacting Massive Particles) [CPZi]

ESIb Mineral Rods (These are found in Alpine rocks that were formed more than 400 kilometers down.)

ESIc Metal-Rich Globules in Rocks

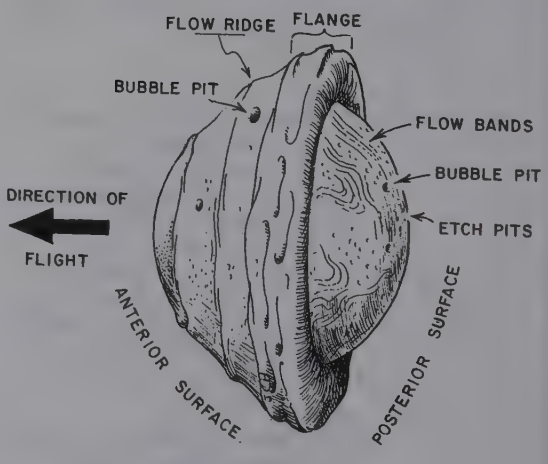
ESId Airplane from 1942 Completely Encased in Ice, Greenland,

ESM ANOMALOUS SUPERFICIAL GEOLOGICAL MATERIALS

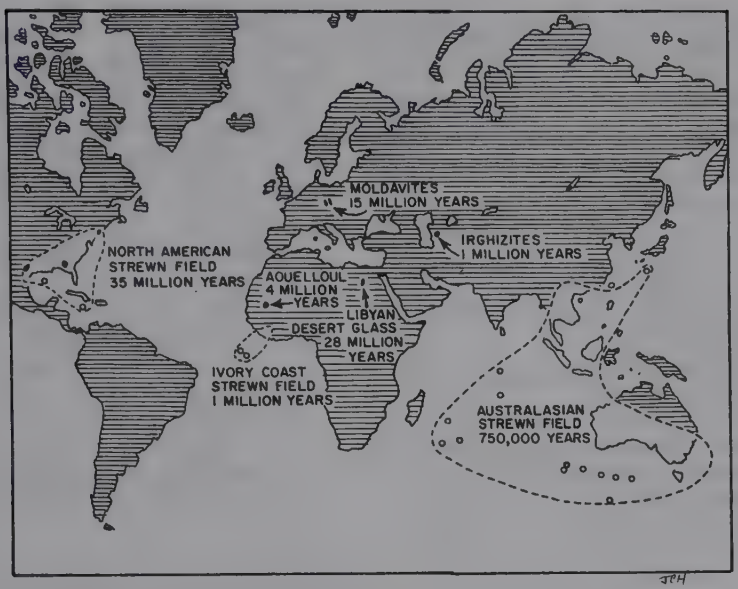
ESM1 Unusual Superficial Aggregations of Rocks (e.g.; Antarctic and Nullarbor meteorites [AYB4]

ESM2 Strewn Fields of Natural Glasses (e.g.; Darwin Glass, Libyan Desert Glass)

ESM3 Tektite and Microtektite Paradoxes and Anomalies
- 3.1 The Great-Circle Distribution of Tektites
- 3.2 The Age Paradox (The Australites occur in young sediments but are much older radiometrically.)
- 3.3 The Distance Paradox (i.e.; the inexplicably great extent of many strewn fields)
- 3.4 The Large Sizes and Unusual Shapes of the Muong Nong Tektites
- 3.5 Tektite Falls Correlated with Geomagnetic Field Reversals



A flanged, button-type australite that shows the melting and ablation produced by passage through the atmosphere. (Meteorite, p. 24, February 2001.) [ESM3]

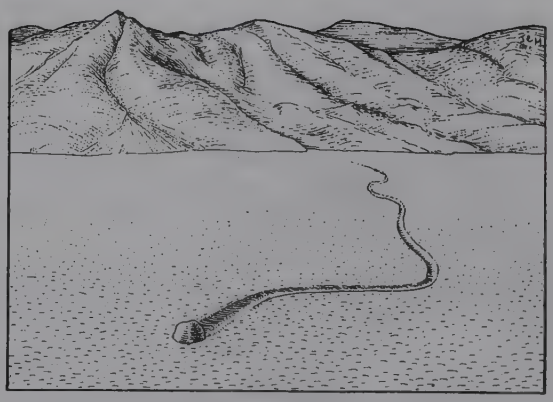


Some of the recognized tektite strewn fields. Most, but not all, are associated with impact craters. (Science, 239:116, 1978.) [ESM3]

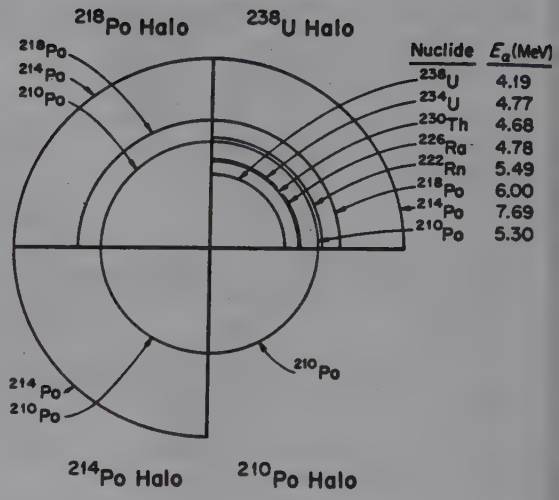
3.5 Tektite Falls Correlated with Periods of Geological Upheavals
3.6 The Recency Paradox (i.e.; extreme rarity of tektites in older strata) [AYEh, ESI8]
3.7 Possible Unrelatedness of Tektites and Seafloor Microtektites
3.8 Missing Crater Sources (e.g.; Australites) [ETHc]

ESM4 Boulder Trains and Belts (e.g.; Richmond boulder train, Massachusetts)
ESM5 Rock Glaciers, Block Fields, Stone Runs (e.g., Falkland Island stone runs)
ESM6 Elevated Erratics in Glaciated Areas (i.e.; glacier-carried boulders higher than their sources)
ESM7 Anomalous Glacial Drift (e.g.; Permian Equatorial glacial drift) [EWTb]
ESM8 Fluidized Debris Slides (e.g.; Hawaiian submarine landslides) (These slides seem to have created immense tsunamis in the past.)
ESM9 Surging Glaciers
ESM10 Driftless Enclaves within Glaciated Regions
ESM11 Anomalous Rock Motion (e.g.; sliding rocks, Racetrack Playa, California)
ESM12 Superficial Rocky Debris of Doubtful Provenance (e.g.; beach sands on deep-sea floors [ESD4, ESD9]
ESMa Clinkers in Snags Following Forest Fires
ESMb Nonglacial Erratics (e.g.; in English chalk beds)

Hawaiian landslides have runouts beneath the ocean of up to 145 miles. (Geology, 23:125, 1995) [ESM8]



A sinuous, 250-meter-long path created by a sliding rock at Racetrack Playa, California. (Science, 117:438, 1953.) [ESM11]

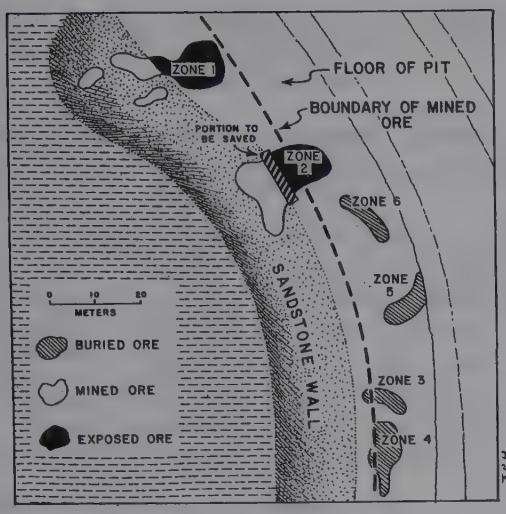


Halos associated with the decay of uranium-238. Some polonium halos, however, have no known precursors. (Physics Today, 35:13, October 1982.) [ESP1]

ESMc Unexplained Origin of Immense Amber Lumps (e.g.; 521 pounds) [ESI4]
ESMd Precariously Balanced Rocks [MSD5]
ESMe Snow Doughnuts
ESMf Layers of Extraterrestrial Dust in Ocean Sediments
ESMg Snowballs Covering Sea Surface
ESMh Areas of Ice-Rafted Debris on Sea Floor (i.e.; Heinrich Events)
ESMi Gulf of Mexico Dead Zone
ESMj An Immense Floating Forest (e.g.; Pacific Ocean, 1905)
ESMk Beaches Containing Much Alien Sand (e.g.; 10% of Bermuda beaches deposited by birds)
ESMl Natural Stone Spheres

ESP ANOMALOUS PHYSICAL PHENOMENA IN GEOLOGY

ESP1 Anomalous Radiohalos (e.g.; giant halos of unknown origin, isolated Polonium radiohalos) [CNRf]
ESP2 Flexible Rocks (e.g.; paper coal, mountain leather)
ESP3 Unusually Colored Rocks (e.g.; colored icebergs, Antarctica)
ESP4 Noncrushing of Delicate Fossils in Sediment Compaction
ESP5 Remarkable Polished Rocks (e.g.; the Rodadero, Cuzco, Peru)
ESP6 Remarkable Ringing Rocks (Rock pieces sometimes ring at the same frequency as their parent rock.)
ESP7 Small-Scale Magnetic Anomalies (e.g.; magnetic boreholes)
ESP8 Frazil Ice, Anchor Ice, Ground Ice (e.g.; controversy over formation of anchor ice)
ESP9 Long-Range Fine Structure in Strata (e.g.; coal laminae)
ESP10 Jointing, Cleat, Crack Patterns (e.g.; prismatic sandstone)
ESP11 Shocked Mineral Grains at Geological Boundaries (e.g.; the Cretaceous-Tertiary boundary [ESM3, ESI2]
ESP12 Radiometric Dating Discordances (i.e.; Substantial differences between radiometrically determined ages of rocks compared to ages estimated from geological considerations and other forms of dating) [CND]
ESP13 Natural Fission Reactors (e.g.; Oklo, Gabon)
ESP14 Musical Sands (e.g.; Sand Mountain, Nevada)
ESP15 Luminous Rocks (Stresses can cause rocks to glow.)
ESP16 Explosive Rocks (e.g.; rock bursts in mines)



Six known natural-nuclear-reactor zones at Oklo, Gabon, where lenses of exceptionally rich uranium ore exist. (Scientific American, 235:36, July 1976.) [ESP13]

ESP17 Dry Quicksand (This is sand in which objects sink rapidly with little resistance, as in famous spots in the Arabian Desert)

ESP18 Glacieres/Natural Refrigerators (Glaciere phenomena are not completely understood.) (e.g.; Coudersport Ice Mine, Pennsylvania)

ESP19 Radioactive Fossils (e.g.; dinosaur bones from Mongolian Desert)

ESP20 Clustering of Mineralogical Dates in Time and Space

ESP21 Unknown Source of Random Cracking around Radioactive Inclusions

ESPa Remarkable Quicksands (e.g.; the famed Nodoroc, Georgia)

ESPb Mud Springs

ESPc Ice Discs on Water Bodies (These usually form in rivers often and rotate within circular holes in the ice.)

ESR PHENOMENA OF THE OUTER CRUST

ESR1 Incompleteness of the Stratigraphic Record: the Missing Strata (e.g.; Grand Canyon is missing the Ordovician and Silurian Periods)

ESR2 Lateral Variations in Strata (e.g.; interfingering of strata)

ESR3 Apparently-Inverted Strata (Such believed to occur in low-angle thrust faulting.) (e.g.; Chief Mountain, Montana)

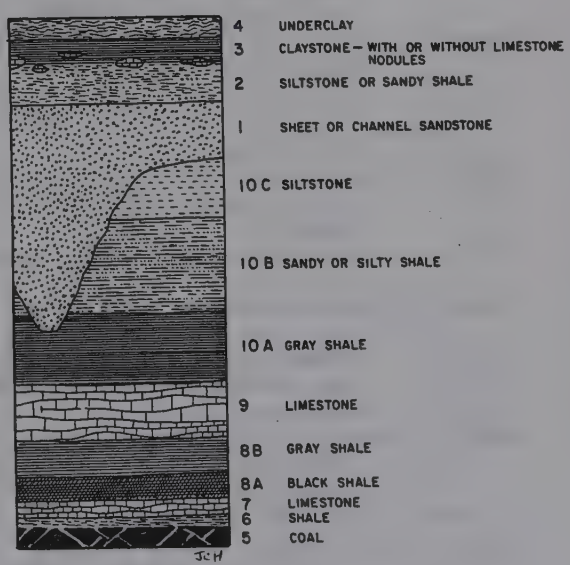
ESR4 Near-Global Unconformities (e.g.; Cambrian-Precambrian unconformity, late Paleozoic unconformities)

ESR5 Anomalies of Rythmites and Cyclothems

5.1 Cyclicity Uncorrelated with Known Natural Cycles

5.2 Puzzling Cyclic Geochemical Phenomena (e.g.; banded iron, stacked layers of flints)

5.3 Persistence of Cyclothems and Rhythmites over Great Areas (especially very thin strata)



A generalized cyclothem (a repeating sequence of the same strata). Not all members are present at a given location. A common repeating sequence is: 1, and/or 2, 4, 5, 8, 9, and 10. (Geology, 15: 233, 1987.) [ESR5]

5.4 Incompatibility of Some Cyclothem Members (Fireclays) with the Accepted Paradigm of Coal Formation
5.5 Rhythmite Counts That Conflict with Radiometric Time Measurements

ESR6 Undisturbed and Unconsolidated Ancient Sediments (e.g.; the amazing horizontality of Grand Canyon strata retained over hundreds of millions of years)

ESR7 Vertical Stacking of Deposits (e.g.; Permian multi-story sandstone inTexas) [ESC13]

ESR8 Continent-Type Rocks in the Ocean Depths (e.g.; Galicia Bank, Rockall-Faeroe Plateau) [ETLk]

ESR9 Exotic Terranes (i.e.; blocks of continental or oceanic crust located far from place of origin) (e.g.; inland ophiolites, Alaska's many exotic terranes)

ESR10 Long Belts of Igneous and Metamorphic Rocks (e.g.; greenstone belts, Andesite Line)

ESRa Deep, Highly-Saline-Water Layers in Lakes and Inland Seas (e.g.; parts of the Mediterranean) [ESC12]

ESRb Records of Major Episodes of Geological Change (e.g.; anoxic events, basalt flooding, the Mediterranean evaporites)

ESRc Leaky Seas (The Sea of Aral is mysteriously losing its water.)

ESRd Origin of the Ice Beds in Permafrost

ESRe Puzzle of the EM-1 Signature at Hot-Spot Volcanoes (EM = Enriched Mantle. It refers to anomalous radiogenic isotopes in some basalts.)

ESRf Records of Missing Antarctic Ice Shelves (e.g.; the controversial Piri Re'is map) [MGMb, ESD5]

ESRg Remarkable Buried Boulder Beds (e.g.; at Cretaceous-Tertiary Boundary near Cuba)

ESX PIERCEMENT STRUCTURES, INTRUSIVES, EXTERNAL IMPRESSIONS

ESX1 Polystrate Fossils (i.e.; fossils that penetrate deeply into or through one or more strata) (e.g.; polystrate trees, South Joggins, Nova Scotia) [ESC14]

ESX2 Diapir Anomalies (Diapirs are plastic deposits, such as salt that invade other deposits.)
2.1 Diapirs without Remnants of the Strata They Pierced
2.2 Diapirs in Deep Ocean Basins (e.g.; off Newfoundland at 4,000 meters)
2.3 Diapirs Composed of Materials Other Than Evaporites (e.g.; chalk diapirs)

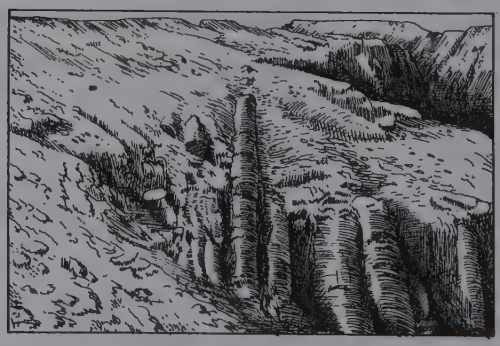
ESX3 Anomalies of Stigmaria (The morphologies, dispositions, and locations of fossil stigmaria---tree structures---that imply an allochthonous rather than autochthonous origin for coal; in other words, coal may not originated where is now found.)

ESX4 Perplexing Intrusives (e.g.; large sandstone dikes)

ESX5 Unusual Striations Attributed to Ice-Sheet Action (e.g.; striations contrary to the established motion of the ice sheets)

ESX6 Anomalous Superficial Markings (e.g.; dinosaur leather, mapstone, Australian zebra rock)

ESXa Very Long Fulgerites (e.g.; a 16-foot-long fulgerite in a Florida beach)



Still-erect buried trees in thick Upper Triassic sandstone in Colorado. (Journal of Geology, 55:511, 1947.) [ESX1]

ET TOPOGRAPHIC ANOMALIES[9]

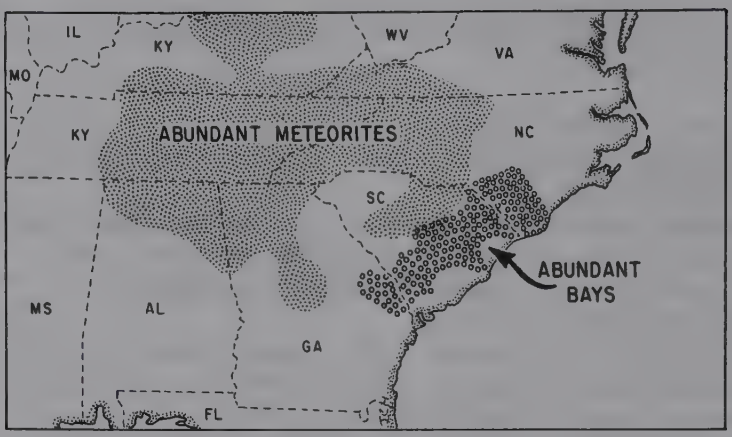
ETB	BAYS, LAKES, SMALL DEPRESSIONS
ETC	CRATERS, ASTROBLEMES, LARGE CIRCULAR STRUCTURES
ETE	RAISED BEACHES, FOSSIL CORAL REEFS, TERRACES
ETH	GUYOTS, PLATEAUS, UNUSUAL MOUNTAINS
ETL	PLANET-SCALE TOPOGRAPHIC ANOMALIES
ETM	MOUNDS AND HILLS
ETP	PATTERNED GROUND, SOIL POLYGONS, BLOCK FIELDS
ETR	ANOMALOUS RIDGES, MEGARIPPLES, ESKERS
ETS	CREVICULAR CRUSTAL STRUCTURE
ETV	VALLEYS, CHANNELS, FURROWS

To an astronaut in satellite orbit, the earth below appears rather smooth. The difference in elevation between the highest mountains and the deepest ocean trenches is only about a dozen miles---this is miniscule roughness on a planet 8,000 miles in diameter. But to a human on the planet's surface, these minor departures from smoothness turn into majestic mountains, that great gash in the sea floor called the Marianas Trench, plus a host of more modest topographic phenomena, such as ridges, valleys, craters, raised beaches, blue holes, and patterned ground; that superficially seem nonanomalous, but nevertheless provide the geologist with an abundance of enigmas. Here are some introductory specifics:

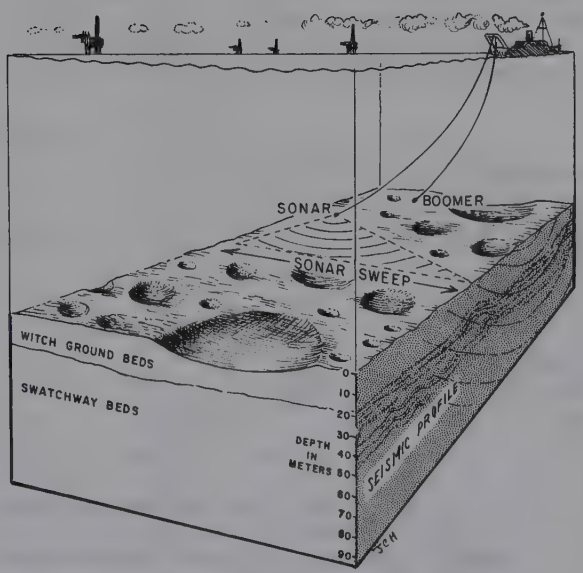
- Some half-million Carolina Bays;
- Recent Tunguska-like surface "disturbances";
- The remarkably recent uplifting of the Andes;
- The curious antipodal positions of the continents;
- The "mush" between the tectonic plates;
- Untold thousands of mima mounds;
- The Andes ice islands;
- Natural sand circles in deserts;
- The puzzles of the so-called walled-lakes;
- The missing sediments eroded from the Grand Canyon; and
- Uneroded, elevated plains of great age.

ETB BAYS, LAKES, SMALL DEPRESSIONS

ETB1	Oriented Lakes and Depressions (e.g.; Carolina Bays)
ETB2	Anomalous Features of Potholes (e.g., wall-fluting, tilted axes)
ETB3	Puzzling Fluid-Vent Craters (e.g.; enormous area of "explosion craters," Myamar) [ETCh, ETM6]
ETB4	Gilgai Topography (Areas of curiously cratered soil of uncertain origin, Australia and elsewhere.) [ETM2, ETPf]
ETB5	Mountain-Top Depressions (e.g.; Enchanted Rock, Texas)
ETB6	Horseshoe-Shaped Depressions
ETB7	Cookie-Cutter Holes (These are shallow holes left by the unexplained removal of large, divot-like slabs of turf, which lie nearby.)
ETB8	Seemingly "Bottomless" Pits (e.g.; Hell's Mouth, Mexico)
ETB9	Large Assemblages of Glacial Kettles
ETB10	Curious Depressions in Chalk Country (e.g.; Hampshire. United Kingdom, where they are called "swallow holes.")
ETBa	Unexplained Giant "Plunge Holes"



Map showing areas of abundant Carolina Bays and meteorite-finds. Actually, meteorites are rare in the area of the bays themselves. (American Scientist, 32:1, 1944.) [ETB1]



Pockmarks on the floor of the North Sea detected by sonar. These may be due to the eruptions of natural gas. (New Scientist, 83:90, 1979,) [ETB3]

(North Carolina mountains, 15 feet deep, 75 feet across, blamed on collapsed waterspout!)

ETBb Unexplained Pits in Glaciers

ETBc Ocean-Surface Depressions (These may be hundreds of miles across and hundreds of feet lower than surrounding ocean. Due to gravity anomalies. Detected by satellites.)

ETBd Lake Vostok Geology and Ice Cover (Antarctica)

ETBe Hydrothermal Vents on Lake Bottoms (e.g.; Lake Baikal)

ETC CRATERS, ASTROBLEMES, LARGE CIRCULAR STRUCTURES

ETC1 Astroblemes (Starwounds) (e.g., buried Chicxulub, Mexico)

ETC2 Very Large Depressions of Probable Meteoric Origin (e.g.; Hudson Bay)

ETC3 Hypothetical Craters (The crater associated with the widespread Australites (tektites) remains undiscovered.)

ETC4 Claimed Periodicity of Crater Ages (Period put at 26-million years.)

ETCa Recent Crater-Like "Disturbances" (e.g., 1930 Brazilian

"event," creating devastated patch of jungle)

ETCb Tunguska-Like Events (e.g., recent New Zealand "air-burst")

ETCc Claimed Crater Chains (e.g.; Argentina, but now doubted)

ETCd Undersea Craters (Suggested as progenitors of giant tsunamis in past.) (e.g.; the Montagnais submarine impact structure offshore Eastern Canada)

ETCe Unexplained Ice Holes in Lakes and Rivers

ETCf Tunguska Site Anomalies and Possible Causes (e.g.; lack of crater and pieces of supposed impactor)

ETCg Possible Additional Cretaceous-Tertiary (KT) Craters

ETCh Gas Explosion Craters [ETB3, ETM6]

ETCi Megaimpacts and Crustal Evolution

ETE RAISED BEACHES, FOSSIL CORAL REEFS, TERRACES

ETE1 Greatly Raised and Submerged Beaches (e.g.; the Marquesas, 1,300 feet high)

ETE2 Greatly Raised and Submerged Fossil Coral Reefs (e.g.; New Guinea coral terraces)

ETE3 Terraces along Rivers, Submarine Canyons, Sea-Floor Channels

ETE4 Inland, High-Level Terraces and Erosion Surfaces (e.g., worldwide concordances of plains and plateaus) [ETV10]

ETE5 Periodically Created Beach Terraces

ETEa Unexplained Large Changes in Lake Levels (e.g.; Devil's Lake, North Dakota, rose 25 feet in 7 years) [GHCc]

ETEb Large Sea-Level Changes (e.g., Vail sea-level curves)

ETEc High-Frequency Variations in Sea-Levels (i.e., 3-6 minute periods)

ETEd Disappearing Islands in History (e.g.; Hy Brazil)

ETH GUYOTS, PLATEAUS, UNUSUAL MOUNTAINS

ETH1 Arguments Regarding the Origin of Flat-Topped Seamounts (i.e.; the "guyots")

ETH2 Anomalous Oceanic Plateaus (e.g., Rockall Bank)

ETH3 Mountain Curiosities (e.g., British Tors, Uinta Range, an east-west range in Utah)

ETHa Disputed Origin of the Rockies

ETHb Unusual Oceanic Transverse Ridges (e.g., Pukapuka Ridges)

ETHc Rapid Uplift of the Andes [ESB6]

ETHd Origin of Wave Rock, Australia

ETHe Unusual Fault Scarps (e.g., Parvie Fault)

ETHf Remarkable Altitude Concordances of Mountain Ranges (e.g., the Alps, the Rockies)

ETHg Origin of Undersea Serpentine Mountains

ETHh Giant Undersea Landslides (Many square miles in extent. Probable sources of huge ancient tsunamis.) (e.g., Hawaii)

ETHi Sunken Land Bridges (e.g., Africa-Madagascar)

ETL PLANET-SCALE TOPOGRAPHIC ANOMALIES

ETL1 Land-Water Distribution Anomalies (e.g., antipodal positions of continents)

ETL2 Anomalies of Island Arcs (e.g., multiple-arc structures

ETL3 Global Patterns of Lineaments

ETL4 Relative Velocities of Continents (Some are contrary to predictions of plate tectonics.)

ETL5 Indications of an Expanding Earth

5.1 Sea-Floor Spreading Has Exceeded Subduction

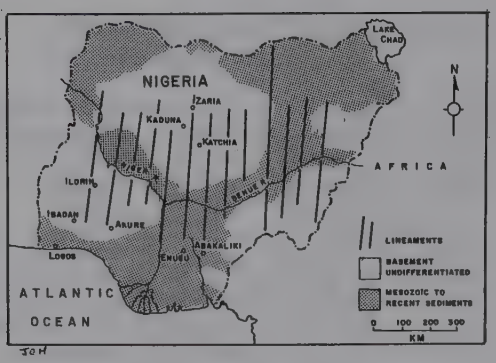
5.2 Paleomagnetic Evidence of Radius Changes

5.3 Evidence of Anomalous Hot-Spot Traces

5.4 No Ancient Oceanic Crust

ETL6 Continental Fits---Some Good, Some Bad, Some Unreasonable (e.g.; eastern Australia fits neatly with eastern North America!)

ETL7 Topographical Anomalies and



Long lineaments in Nigeria that may have been created by crustal failures 500 million years ago. (New Scientist, 73: 302, 1977.) [ETL3]

Objections to Continental Drift (e.g., deep continental roots, inconsistent paleoclimatic data, disputed source of motion, etc.)

ETLa Rapid Rotations and Shifts of Plates

ETLb Far-Wandering Terranes (e.g.; a dozen or more have piled up against Alaska)

ETLc Seamount Shearing [ETH1]

ETLd Inconsistencies in Plate Motions (i.e.; contrary to plate plate tectonics) [ETL4]

ETLe Mid-Atlantic Ridge Dating Anomalies

ETLf Continental "Drip" (The curious teardrop shapes of the continents!)

ETLg "Sunken" State of Continents

ETLh Evidence for Plate Compression

ETLi Large Earth Tides (e.g., 30-centimeter bulges)

ETLj Disputed Source of Plate Motions

ETLk Continental Rocks on the Sea Floor [ESR8]

ETLl Inter-Plate 'Mush" (i.e.; poorly defined plate boundaries)

ETLm Evidence Supporting the Hypothesized Lunar Origin of the Continents

ETLn Atlantic Coastal Sediment-Volume Six Times the Pacific's

ETLo Rapid Plate Rifting (Called "burst zips," one off Papua New Guinea is 500 kilometers long and not yet covered by sediment.)

ETLp Off-Rift-Axis Vent Fields

ETLq Old Sediments on Young Sea Floor

ETM MOUNDS AND HILLS

ETM1 Mima Mounds and Similar Structures

ETM2 Mounds in Gilgai Country [ETB4, ETPf]

ETM3 Mudlumps and Mud Islands (e.g.; in the Mississippi)

ETM4 Drumlin Anomalies (e.g., uphill orientation, presence of giant ripple marks) (Drumlins could be a flood phenomenon.)

ETM5 Mounds of the Missoula Flood Surface and Similar Topography (e.g., Siberia) [ETV5]

ETM6 Fluid-Vent Mounds [ETB3]

ETM7 Sandhills and Anomalous Dunes (e.g., Nebraska sand hills)

ETM8 Doughnut-Shaped Mounds (e.g.; eastern Alberta)

ETM9 Dirt Cones on Ice Caps and Snow (e.g.; Iceland, New Zealand)

ETM10 Origin of Ice-Cored Mounds in the Arctic (i.e.; the so-called "pingos")

ETM11 Blister-Like Structures (e.g., Melville Island, Canada)

ETM12 Curious Columnar Structures (e.g., Mono Lake tufa mounds, California)

ETM13 Andes Ice Islands (e.g.; Lake Colorado, Bolivia)

ETM14 Natural Beach Pyramids of Sand or Pebbles (up to 30 feet across)

ETMa Origin of Oceanic Abyssal Hills

ETMb Ice Volcanos

ETMc Hydrothermal Supermounds

ETMd Arctic Mounds of Mostly Fossils

ETMe Raised Marine Muds and Shelly Drifts in Antarctica

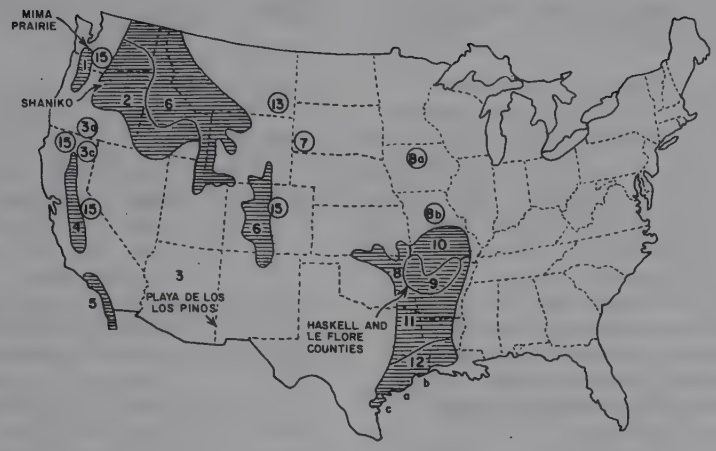
ETMf Tsunami-Caused Dunes [ESM12]

ETMg Self-Organized Beach Cusps [ETM14]

ETMh Antarctica's Stationary Snow Dunes

ETMi Origin of Offshore Sand Ridges [ETR3]

ETMj "Sun Cups" on Snow Fields



Map of the United States indicating the geomorphic provinces where mima mounds and pimpled plains occur. They also are found in Africa and elsewhere. (American Journal of Science, 247:706, 1949.) [ETM1]

ETP PATTERNED GROUND, SOIL POLYGONS, BLOCK FIELDS

ETP1 Patterned-Ground Anomalies (e.g., sorted stripes) [ETM1]

ETP2 Rock Cities and Block Fields (e.g., Baretown, Pennsylvania)

ETP3 Giant Expansion and Contraction Polygons (e.g.; Animas Valley, New Mexico)

ETPa Fingerprint Patterns in Calcareous Soils

ETPb Curious Arrays of Mud Cracks and Curls

ETPc Subsurface Stone Stripes (These must have a different origin than the surface patterned ground in the Arctic.)

ETPd Desert Sand Circles (Called "Sossusvlei" in Namibia.)

ETPe Nullarbor Plain's Striped Ground, Australia (The stripes are 600 by 15 kilometers!)

ETPf Desert Gilgai Patterns [ETB4, ETM2]

ETPg Ice-Wedge Networks and Patterns (They resemble mud cracks, but occur in frozen ground.) (e.g.; Alaska)

ETPh Salt Polygons (e.g., Death Valley)

ETPi Curious Nonrandom Patterns of Arctic Ice Leads

ETR ANOMALOUS RIDGES, MEGARIPPLES, ESKERS

ETR1 Ridges and Ripples in Glaciated Regions (These differ from drumlins and eskers.) [ETR3]

ETR2 Esker Anomalies (e.g., uphill eskers)

ETR3 Marine Megaripples (i.e., with wavelengths of 10 miles and more) [ETMi, ETR1]

ETR4 Moving, Gravity-Created Ripples in Rock (Such were observed in real-time, Culebra Cut, Panama.)

ETR5 Unusual Natural Dams (e.g., Havasu Canyon, Arizona)

ETR6 Lake Walls and Ramparts (e.g.; Walled Lake, Iowa)

ETR7 Buried Ridges within Continental Margins

ETR8 Long Desert Ridges of Unknown Origin (i.e., up to 100 kilometers long, Arabia)

ETS CREVICULAR CRUSTAL STRUCTURE

ETS1 Biological Evidence for Widespread Crevicular Structure (e.g., in interconnected Bahama "blue holes")

ETS2 Fluid-Filled Crevicular Structure at Great Depths (e.g., Kola Peninsula drill hole, 12 kilometers deep)

ETS3 Seismic Evidence for Deep Crevicular Structure (Fluid-filled cracks 20 miles deep believed source of source of earthquakes in eastern North America.)

ETV VALLEYS, CHANNELS, FURROWS

ETV1 Still-Disputed Origin of Submarine Canyons

ETV2 Long Sea-Floor Channels (i.e., 100 miles long or more)

ETV3 Origin of Wind Gaps in Mountains (Actually, wind is not considered the erosive agent here.)

ETV4 Marked Height Differences of Many Opposite River Banks

ETV5 The Channelled Scablands and Similar Terrain (Flood waters do not explain all such terrain.) [ESD4, ETM5]

ETV6 Apparently Youthful Rivers (e.g., Colorado River)

ETV7 Grand-Canyon Anomalies
- 7.1 Accepted Canyon-Cutting Theory Apparently Inapplicable
- 7.2 The Immense Quantities of Sediment from Cutting the Canyon Not in Evidence
- 7.3 Canyon's Relatively Unerode Rim

ETV8 Flume-Like Furrows on Continental Slopes

ETV9 Labyrinthine Topography (e.g., Wright Dry Valley, Antarctica)

ETV10 Uneroded, Elevated Plains of Great Age (e.g., Gondwana Surface, South Africa) [ETE4]

ETV11 Deeply Incised Meanders (Meanders theoretically confined to mature, broad valleys.)

ETVa Buried Ancient River Beds (i.e., revealed by radar in the Sahara and elsewhere

ETVb Glacial Tunnel Valleys

ETVc Giant Glacial Grooves

ETVd Step-Pool Sequences

ETVe Enigmatic Valleys (e.g., Saxon Valley, Switzerland)

ETVf River Curiosities (e.g.; ancien courses of the Colorado)

EW GEOLOGY AND CLIMATE

EWC CLIMATE CORRELATIONS AND POTENTIAL CAUSES
EWH CLIMATE-HISTORY MEASUREMENTS
EWM REAL-TIME MEASUREMENTS OF CLIMATE INDICATORS
EWT CLIMATE-CHANGE THEORIES

EWC CLIMATE CORRELATIONS AND POTENTIAL CAUSES

EWCa Volcanic Eruptions Extensive Lava Flows (e.g.; Deccan Traps, India)
EWCb Production of Geothermal Heat
EWCc Strong Tidal Action (1,500-1,800-year cycle brings deep, cold ocean water to surface, causing cold periods, Such as the Little Ice Age.) [EWHe]
EWCd Large Influxes of Cosmic Dust
EWCe Sudden Discharges of North American Lakes into the Oceans
EWCf Increases in Atmospheric Carbon-14 (Such occurred during the last glacial period.)
EWCg Oxygen Levels in Atmosphere
EWCh CO_2 Levels in Atmosphere [EWMa]
EWCi Lake-Varve Records [EWHi]
EWCj Auroral Activity [EWHc]
EWCk Heinrich Events (Seafloor deposits of rock fragments from Arctic regions carried by drifting ice.) [EWHe]

EWH CLIMATE-HISTORY MEASUREMENTS

EWHa Ice-Core Studies (Greenland ice cores suggest sharp climate changes occur in just a few years.)
EWHb Analysis of Deep-Sea Cores
EWHc The Maunder Minimum [ASO4]
EWHd Analysis of Bogs (Bog leaf anaylses for greenhouse gases give different results from Greenland ice cores.)
EWHe The Little Ice Age (Occurred 13th.-17th. centuries.) [EWCk]
EWHf Hemispheric Climate Seesawing
EWHg Conflicting Long-Term Temperature Estimates
EWHh Differing Histories of the Ice Ages
EWHi Lake-Varves as Climate Records [EWCi]

EWM REAL-TIME MEASUREMENTS OF CLIMATE INDICATORS

EWMa The Carbon-Cycle Controversies
EWMb Amount of Polar Ice (Now decreasing in some areas, but increasing elsewhere.)
EWMc Global Warming (Long-term temperature measurements are controversial.)
EWMd Methane in Atmosphere (Biogenic sources larger than suspected; methane-hydrate releases large.) [EWTa]
EWMe NO_2 in Atmosphere

EWT CLIMATE-CHANGE THEORIES

EWTa Methane-Surge Theory [EWMd]
EWTb Snowball-Earth Theory
EWTc Earth Dust-Ring Theory [EWTf]
EWTd Milankovitch Theory (Involves astronomical cycles.)
EWTe Global Warming/Greenhouse Effect Theory
EWTf Ancient-Satellite-Ring Theory [EWTc]
EWTg Cosmic-Radiation Theories (e.g.; gamma-ray bursts, supernovas, etc.)

EZ THE GEOMAGNETIC FIELD AND PALEOMAGNETISM[12]

EZC MINOR PERTURBATIONS OF THE GEOMAGNETIC FIELD
EZF CONFIGURATION ANOMALIES AND SECULAR VARIATIONS OF THE GEOMAGNETIC FIELD
EZP PALEOMAGNETISM: ANOMALIES AND PROBLEMS

Three important questions about the earth and its history are impacted by geomagnetic phenomena and the discipline of paleomagnetism:

- Can the dynamo model of the geomagetic field account all of the field's features, especially the angle between the geomagnetic and rotation axes and the frequent polarity reversals?
- Does paleomagnetism accurately reconstruct the ancient wanderings of the earth's continents?
- Why are geomagnetic reversals correlated with biological extinctions and explosions and several other phenomena?

EZC MINOR PERTURBATIONS OF THE GEOMAGNETIC FIELD

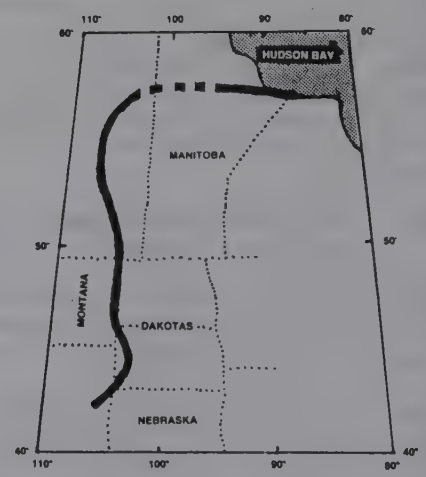
EZC1 Highly Local Compass Anomalies (i.e.; readings more than 10° different from expected values) (e.g., Bezout Island, near Australia) [EZC4]

EZC2 Unusual Magnetized Geological Features (e.g.; peaks repeatedly exposed to lightning)

EZC3 Anomalies of Oceanic Magnetic Anomalies
- 3.1 Magnetic-Stripe Asymmetry
- 3.2 Decrease of Anomaly Amplitude with Distance
- 3.3 Unaccountable Fine Structure of Magnetic Profiles
- 3.4 Magnetic-Stripe Dating Accuracies Questioned
- 3.5 Questionable Correlations and Continuity of Magnetic Anomalies
- 3.6 North Pacific (e.g., origin of "disturbed zones" unknown)
- 3.7 Western Pacific (e.g., Pacific Jurassic Quiet Zone, or PJQZ)
- 3.8 Atlantic (e.g., skewed magnetic anomalies)
- 3.9. Sea-Floor Spreading Compatible with the Expanding-Earth Theory

EZC4 Large-Scale, Geographically-Specific Geomagnetic Anomalies (i.e.; strong deviations from the dipole field) (e.g.; the Great Arctic Magnetic Anomaly) [EZC1]

EZC5 Earth-Current Anomalies (e.g.,



The dark streak looping west and south from Hudson Bay represents the North American Central Plains (NACP) electrical-conductivity anomaly, as mapped by magnetometer surveys. (Geophysical Research Letters, 13:685, 1986.) [EZC5]

North American Central Plains Conductivity Anomaly)

EZCa Arguments about Lodestone Origins

EZCb Earth Currents as Earthquake Precursors

EZCc Terrestrial Natural Batteries: Their Environmental and Biological Effects

EZCd Deep Electrical Anisotropies

EZCe Magnetosphere Corrugations (as detected by satellites)

EZF CONFIGURATION ANOMALIES AND SECULAR VARIATIONS OF THE GEOMAGNETIC FIELD

EZF1 Steady-State-Field Anomalies
- 1.1 The Tilt of the Geomagnetic Dipole Axis with Respect to the Axis of Rotation
- 1.2 Departures from an Ideal Dipole (e.g.; shallow patches of magnetism)

EZF2 Secular-Variation Anomalies (e.g.; drift of the geomagnetic field) [EZFc]

EZF3 Problems in Explaining the "Dynamo" Origin of the Geomagnetic Field

EZFa Geomagnetic "Jerks" [EZF2]

EZFb True Polar Wander

EZFc Purported Rapid Decay of the Field [EZF2]

EZFd Geomagnetism Correlated with Earth's Rotation

EZFe Geomagnetic Field More Variable at Sea

EZFf Non-Dipolar Ancient Fields

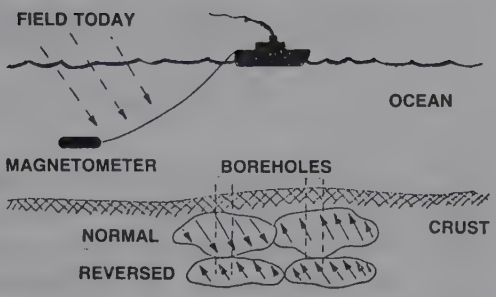
EZP PALEOMAGNETISM: ANOMALIES AND PROBLEMS

EZP1 Problems in Measuring and Interpreting Paleomagnetism (e.g., spontaneous self-reversal)

EZP2 Anomalous Excursions and Reversals (e.g.; the Steens Mountain reversal) [EPZb, EPZc]

EZP3 Anomalies Implied by Paleopoles (e.g., multiple paleopoles)

EZP4 Inconsistencies in Paleomagnetic Measurements (e.g.; many strong excursions not detected globally)



Ship-towed magnetometers sometimes indicate strong reductions of field intensity in magnetic-anomaly regions. Deep drilling at such sites reveals the existence of localized hodgepodges of rocks with normal and reversed polarities. (Eos, 50:130, 1969,) [EZP1]

EZP5 Correlations of Polarity Reversals with Other Phenomena
- 5.1 Biological Explosions [ESB2]
- 5.2 Biological Extinctions [ESB1]
- 5.3 Tektite Falls [ESM3]
- 5.4 Climate Changes [EWT]
- 5.5 Volcanism
- 5.6 Changes in Earth's Spin Rate
- 5.7 Changes in Earth's Orbital Eccentricity
- 5.8 Impact Events [EZP5.2]
- 5.9 Black-Shale Deposits
- 5.10 Sea-Level Changes

EZPa Very Rapid Field Reversals [EPZ2]

EZPb Favored Reversal Paths and Sectors

EZPc Transitional States between Geomagnetic Reversals

EZPd Many Suggested Causes of Reversals [EZP5]

EZPe Large Pole Shifts (i.e.; short of total reversals)

EZPf Reversals from Causes External to the Core [EPZ5]

G GEOPHYSICS

GE ELECTROMAGNETIC PHENOMENA IN THE ATMOSPHERE
GG GRAVITATIONAL PHENOMENA
GH PHENOMENA OF THE HYDROSPHERE
GI INCENDIARY PHENOMENA
GL LUMINOUS PHENOMENA
GQ SOME STRANGE PHENOMENA OF EARTHQUAKES
GS UNUSUAL SOUNDS IN NATURE
GW WEATHER PHENOMENA

PRIMARY SCIENCE SOURCES EXAMINED IN GEOPHYSICS

American Meteorological Society, Bulletin (79 vols.)
Eos (formerly American Geophysical Union, Transactions) (90 vols.)
Geophysical Research Letters (28 vols.)
Journal of Atmospheric and Terrestrial Physics (34 vols.)
Journal of Geophysical Research (105 vols.)
Marine Observer (72 vols.)
Meteoritics (35 vols.)
Meteorological Magazine (formerly Symons's Meteorological Magazine (104 vols.)
Monthly Weather Review (129 vols.)
Popular Science Monthly (first 87 vols.)
Royal Meteorological Society, Quarterly Journal (121 vols.)
Seismological Society of America, Bulletin (40 vols.)
Weather (54 vols.)
Weatherwise (50 vols.)

GE ELECTROMAGNETIC PHENOMENA IN THE ATMOSPHERE[4]

GEB RARE RAINBOWS AND ALLIED SPECTRAL PHENOMENA
GEH UNUSUAL HALO DISPLAYS AND CORONAS
GEI OBSERVER-CENTERED PHENOMENA
GEL LOW-SUN PHENOMENA
GEM THE MAGIC OF MIRAGES
GER RADIO AND RADAR ANOMALIES
GES SHADOW PHENOMENA
GEZ ANOMALOUS MAGNETIC AND ELECTRIC-FIELD DISTURBANCES

The atmosphere plays many curious optical tricks, from sideways mirages to all-red rainbows to radar "angels." The venerable laws of optical reflection, refraction, and color dispersion are adequate to explain the great majority of these frequently breath-taking displays of colors, shadows, halos, and bows. Undoubtedly, these same laws will ultimately account for all of the phenomena tabulated below. Nevertheless, many enigmas remain. Here are a few:

- Offset solar halos;
- Rainbows with offset white arcs;
- A few halos with still-unexplained radii;
- The peculiar fine structure of the green flash;
- Giant low-sun shadow bands seen from aircraft and mountain peaks;
- "Mock" mirages;
- All aspects of the long-delayed radio echos (LDEs);
- Solar-eclipse shadow bands moving in the wrong direction; and
- Shadow bands seen in the atmosphere.

GEB RARE RAINBOWS AND ALLIED SPECTRAL PHENOMENA

GEB1 Unusual Multiple Rainbows (See also secondary, reflection, and supernumerary rainbows) [GEBa, GEB15]

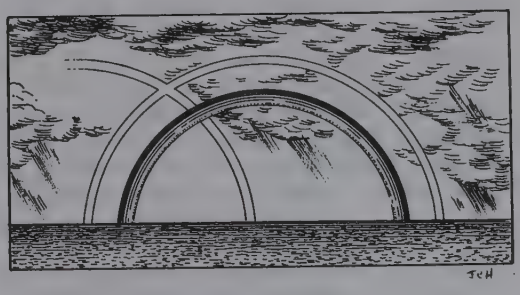
GEB2 Intersecting Rainbows (Most probably due to reflecting bodies of water.)

GEB3 Lunar Rainbows with Unexplained Offset White Arcs and Bows

GEB4 Red Rainbows (These are seen only during sunrise and sunset, when short wavelengths are absorbed by atmosphere.) [GEB14]

GEB5 Moving Rainbows: Rare But Explicable [GEM3]

GEB6 Solar Rainbows with Unexplained



North Atlantic Ocean, 1948. Primary and secondary lunar rainbows plus an unexplained offset white arc. (Marine Observer, 19:188, 1949.) GEB3]

Offset White Arcs

GEB7 Lunar Rainbows Transforming to White Disks

GEB8 Radial Streaks Crossing Rainbows (Antisolar rays probably involved here.) [GEL2]

GEB9 Rainbows Perturbed by Thunder and Lightning

GEB10 Anomalous Fogbows or White Rainbows (Most, but not all, fogbows due to very tiny droplets and explicable.)

GEB11 Anomalous Dewbows, Cloudbows, Horizontal Rainbows (Most display inexplicable geometries and color sequences.)

GEB12 Sandbows (Probably due to blown spheres of polished sand.)

GEB13 Rainbows Close-To and Parallel-To the Horizon (These may cover one-fourth of the horizon.)

GEB14 Purple Rainbows (Seen only at sunrise, when they should be red.) [GEB4]

GEB15 Supernumerary Rainbows (Segments of bows between the primary and secondary bows. Due to optical interference.)

GEB16 Tall, Prismatic Pillars Based at the Feet of Rainbows

GEB17 The Dark Space between Primary and Secondary Rainbows (Phenomenon now explained.)

GEB18 Grossly Distorted Rainbows (Irregular shapes and color sequences.)

GEB19 Rainbows Dividing Sky Colors (Dark sky outside, light inside.) [GEH4]

GEB20 The Odor of the Rainbow (Due probably to the odors created by a passing shower.)

GEBa Very Rare Tertiary and High-Order Rainbows

GEBb Unexplained Segments of Greyish Light in the Sky [GEBf]

GEBc Polarization of Rainbow Light

GEBd Double White Rainbows

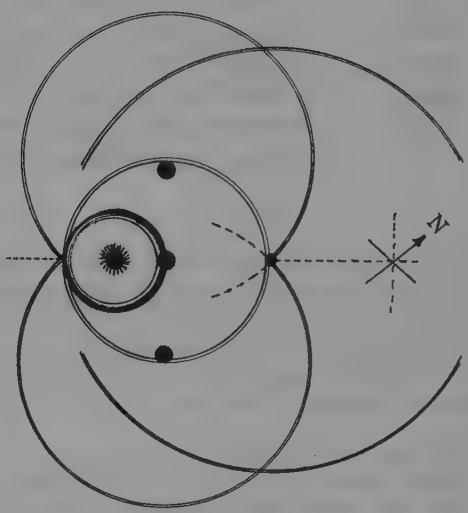
GEBe Approachable "Rainbows" (May actually be heiligenschein or broadcast rainbows.) [GEB11, BEI2]

GEBf "Skylines": Unexplained Dark Lines in the Sky [GEBb]

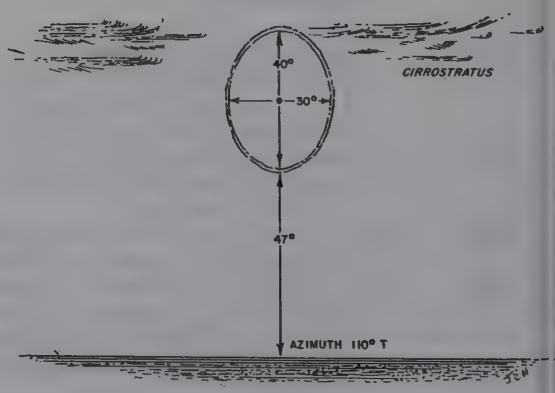
GEH UNUSUAL HALO DISPLAYS AND CORONAS

GEH1 Offset Halos and Anomalous Arcs (Possibly due to secondary light sources.)

GEH2 Noncircular Halos (e.g.; strongly elliptical halos)



Rhode Island, 1816. Normal and offset solar halos with three mock suns. The true sun is marked with rays. (American Journal of Science, 1:11:325, 1826.) [GEH1]

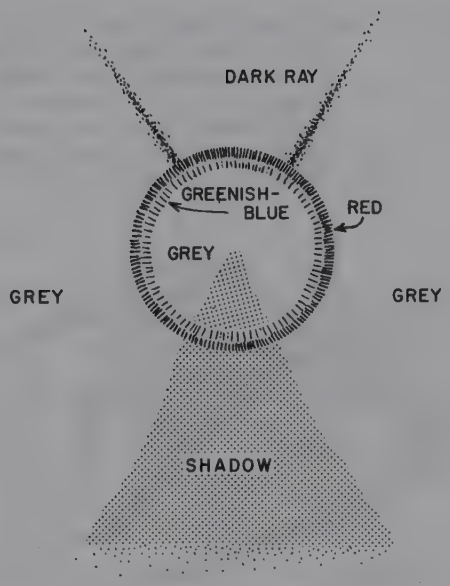


A rare elliptical halo. (Journal of Meterology, U.K., 6:133, 1981.) [GEH2]

GEH3 Extraordinarily Complex Mock-Sun and Mock-Moon Displays (Eight mock suns in one case.)
GEH4 Halos Dividing Sky Colors [GEB19]
GEH5 Bishop's Ring and Other Rare Coronas (Very large rings of color around sun or moon. Common after large volcano eruptions.) [GEHe]
GEH6 Halos of Unusual Radii (e.g.; 7°, 15°, 34°, etc.) (The "standard" halos measure 22° and 46°.)
GEH7 Jumping and Moving Halos
GEH8 Kaleidoscopic Suns (Multiple rays and spheres of variously colored light. Several consistent reports.)
GEH9 Skewed and Deformed Halo Displays
GEH10 Bottlinger's Rings (These are white rings concentric about the sun.)
GEH11 Transient Lines Superimposed on Halo Displays
GEH12 Optical Effects Where Halo Displays Touch the Horizon (i.e.; spectral patches)
GEH13 Close, One-Sided Mock Suns (only 10° from sun.)
GEH14 Halo Displays Formed by Terrestrial Ice Crystals (Hyperbolic halos seen on the ground.)
GEHa Lunar Coronas with Anomalous Radii
GEHb Scheiner's Halo
GEHc Antihelic Arcs
GEHd Circumzenithal Arcs with Black Bands

GEI OBSERVER-CENTERED PHENOMENA

GEI1 Puzzling Features of the Brocken Specter (This is the observer's shadow cast upon a veil of mist. It is usually surrounded by rings of color. The observer sees only his own shadow. Dark radial lines often seen.) [GEM9, GES8]
GEI2 Heiligenschein (Like the Brocken Specter but involving droplets on vegetation, commonly wet grass.) [GEIa]
GEI3 Rotating Spokes about the Shadow of One's Head (This effect seen on a water surface.)
GEIa "Silvanshine" (i.e.; Heiligenschein from shiny vegetation)
GEIb Snow Sparkles (i.e.; reflections from large snow crystals)

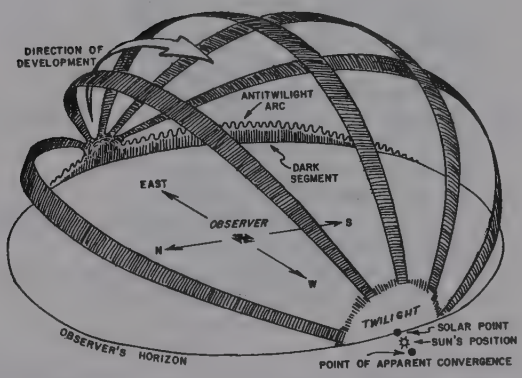


The famous shadow of Adam's Peak in Sri Lanka accompanied by a glory with radial rays. (Nature, 33:532, 1886.) [GEI1]

GEL LOW-SUN PHENOMENA

GEL1 Puzzling Features of the Green Flash:
1.1 Multiple Green Flashes
1.2 Multiple Rays of Green Light
1.3 Beads and Other Fine Structure of Green Flashes
1.4 Greening of Local Objects Prior to Green Flashes
1.5 Appearances of Green Well before Sunsets
1.6 Psychological Basis for Some Green-Flash Observations
1.7 Capriciousness of Green Flashes (They often fail to appear under what seem to be ideal conditions.)
1.8 Apparent Inadequacy of Standard Refraction Theory

GEL2 Anomalous Diverging Rays at Sunset and Sunrise (Similar to crepuscular rays, they may occur in a cloudless sky and stretch between solar and antisolar points. Often evenly spaced.)



Well-defined shadow bands cross the entire sky at twilight in Ethiopia. (Weather, 23:70, 1968.) [GEL2]

GEL3 Color Changes When the Earth's Shadow Is Cast upon the Sky

GEL4 Abnormal Refraction Phenomena as Astronomical Objects Approach the Horizon (e.g.; double suns, moons, etc.)

GEL5 Anomalous Aspects of the Brilliant, Prolonged Krakatoa Sunsets (i.e.; their intermittent nature, reappearance 2 years later)

GEL6 The Alpine Glow or Alpengluhn (The reappearance, 10-15 minutes later, of the common rosy glow on Alpine peaks.)

GEL7 Spectral Dispersion near the Sea's Surface [GEB13]

GEL8 Low-Sun Landscape Fluorescence

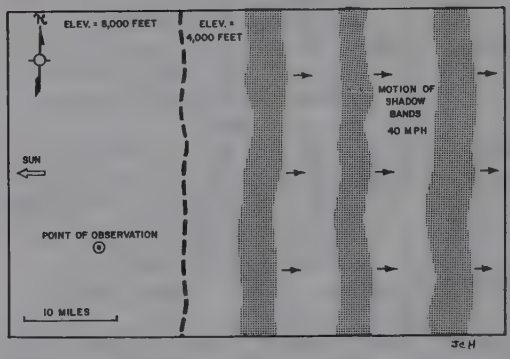
GEL9 Low-Sun Spectral Bows (These appear after the sun has set, but not always centered on the setting point.)

GEL10 Low-Sun Shadow Bands (Seen just before sunset and after sunrise. They appear on flat surfaces near mountain crests.)

GEL11 The Second Purple Light (A semicircular patch 1½ hours after sunset and before sunrise.)

GEL12 Moving Patches of Light on the Horizon

GELa Unexplained Post-Twilight and Pre-Dawn Brightenings of the Sky (May be identical to the so-called "false dawn.") [GLA25]



Sunset shadow bands are occasionally seen crossing flatlands in western North America by observers in aircraft or on mountain vantage points. (Optical Society of America, Journal, 35:736, 1945.) [GEL10]

GEM THE MAGIC OF MIRAGES

GEM1 Fata Morganas (The classical fata morgana magnifies and distorts distant natural object so that they appear to be buildings, armies, and other misinterpretations.) (e.g.; Muir glacier's "Silent City," Alaska)

GEM2 Telescopic Mirages (Magnified images of objects over 100 miles distant.)

GEM3 Lateral Mirages (Side-by-side duplication of an object.)

GEM4 Multiple Mirages (Two or more images of an object.) (e.g.; a triple crescent moon, 1958)

GEM5 Mirages Sensitive to the Observer's Position (Movement of just a few feet destroys the mirage.)

GEM6 The Novaya Zemlya Effect (In polar regions, one or more distorted images of the sun which is hidden by the horizon.)

GEM7 Illusions of a Flat Earth (e.g.; an illusion seen on the Bedford Canal, England)
GEM8 Dynamic Mirages (An effect of atmospheric changes.)
GEM9 Mirror or Reflection Mirages (Claims of apparent reflections of the observer and surroundings in the sky. Brocken Specters?) [GEI1]
GEMa Ghost Moons and Ghost Lunar Crescents (e.g.; when the old-moon is in the new-moon's arms, sometimes a transparent second crescent appears opposite on the moon's dark limb)
GEMb Mock Mirages (These are analogous to mock suns or "sun dogs," but they are rare.)

GER RADIO AND RADAR ANOMALIES

GER1 Long-Delayed Radio Echos (LDEs) (Signal echos delayed several seconds---even a couple minutes. Blamed on ionosphere ducts.)
GER2 The Moon's Effect on Radio Propagation
GER3 Thunderstorm Modification of Radio Propagation
GER4 Stable Patterns of Electromagnetic Radiation
GER5 Unidentified Radio Signals and Disturbances (e.g.; Tesla's report of a signal from Mars, 1899!) [XSSa]
GER6 The Humming Earth (e.g.; 7.8 hertz)
GER7 Episodic Polar Radio-Blackouts
GER8 Around-the-World Transmission of High-Frequency Signals (e.g.; a 37 megahertz signal) (Radio signals at this high frequency should not be reflected by the ionosphere.)
GER9 Periodic Fading of Satellite Radio Transmissions
GER10 Sudden Disappearance of High-Frequency Radio Transmissions
GER11 Claims of a Correlation of Radio Propagation Quality with Planetary Positions [GEZ4, GQS7, GWS8]
GER12 Earthquake-Induced Ionospheric Disturbances
GER13 Easier Radio Transmission in One Direction than Its Reverse
GER14 Radar Dot Angels (Small targets unseen visually.)
GER15 Radar Ring and Line Angels (Due, usually, to atmospheric phenomena.)
GER16 Radar Ghosts (Real targets that are displaced in range and/or azimuth.)
GERa Large-Scale Shifting of Radar Targets
GERb Claims of Zones of Radio Silence (e.g.; in Mexico)
GERc Unexplained Bursts of Radio Noise
GERd Effect of Meteor Storms on Radio Propagation (Meteors leave high-altitude, ionized trails.)

GES SHADOW PHENOMENA

GES1 Eclipse Shadow Bands
1.1 Bands Moving in the Wrong Direction
1.2 Bands of Huge Width
1.3 Colored Bands
1.4 More Than One Set of Moving Bands
GES2 Moving Shadow Bands in the Atmosphere [GEH11]
GES3 Colored Shadows (e.g.; blue, purple, or green shadows have been seen. Green is common near sunset. [GEL1, GWP10]
GES4 Shadow Bands or Splotches Seen through the Telescope (Atmospheric inhomogeneities are a possible cause.)
GES5 Unusual Shadows Observed during Eclipses (e.g.; bright crescents in tree shadows) (These are images of the eclipsing sun created by pinhole-camera action.)
GES6 Non-Eclipse Shadow Bands (Produced by the uneclipsed sun and artificial lights.)
GES7 Persistent or "Living" Shadows (Seen on oily surfaces.)
GES8 Curious Mountain Shadows (e.g.; the famous shadow of Adams Peak, Sri Lanka) (Another Brocken Specter!) [GEI1]
GESa Curious Shadows of Aircraft Condensation Trails

GEZ ANOMALOUS MAGNETIC AND ELECTRIC-FIELD DISTURBANCES

GEZ1 Unexplained, Sudden Geomagnetic Disturbances

GEZ2 Claimed Effect of the Moon's Position on the Geomagnetic Field

GEZ3 Effects of Solar Eclipses on Geomagnetism

GEZ4 Effects of the Planets on the Geomagnetic Field [GQS7, GWS8]

GEZ5 Meteor Activity Correlated with Geomagnetic Activity

GEZ6 Terrestrial Electrical Effects Correlated with Meteors (e.g.; claims of abnormal currents in conductors, electrical shocks to humans)

GEZ7 Geomagnetic Disturbances Correlated with Stellar Activity

GEZ8 Claims of Gravity Waves Correlated with Geomagnetic Storms (e.g.; a 1969 event) (Questionable because no gravity-wave detectors have been shown to work.) [CFGa]

GEZa Geomagnetic Fluctuations Affected by Geological Features

GEZb Effects of Comets on Geomagnetic Activity

GEZc Effects of Earthquakes on the Electric Field

GEZd Unusual Structures of Stratospheric Electric Fields

GEZe Geomagnetic Fields and Weather Prediction

GG GRAVITATIONAL PHENOMENA

GGF VARIATIONS IN GRAVITY
GGH PROBLEMATIC MAGNETIC HILLS

GGF VARIATIONS IN GRAVITY

GGFa Nontidal Variations of the Gravitational Field

GGFb Claims of Periodic Changes in Gravity [CFGd]

GGH PROBLEMATIC MAGNETIC HILLS

GGHa Locations Where Gravity Seems Defied (e.g.; Spook Hill, Oregon Vortex, and Kin)

GH PHENOMENA OF THE HYDROSPHERE[3]

GHC UNUSUAL PHENOMENA OF WATER SURFACES
GHG GEYSERS, PERIODIC WELLS, BLOWING CAVES
GHS THE BEWILDERING VARIETY OF TIDES
GHT OCEAN TURBULENCE AND CIRCULATION PHENOMENA
GHW REMARKABLE WAVE PHENOMENA

What we term "weather" transpires in the atmosphere, but seven-tenths of the earth is covered with a thin coating of water that possesses "weather" of a different sort. The most accessible of these water phenomena occur on ocean and lake surfaces: the waves. The more ponderous movements of water that we call "tides" make themselves known at the land-sea boundaries. The water-weather that transpires below the surface is still largely a mystery. Of course, we do recognize some major currents, such as the Gulf Stream, and the giant eddies called "meddies," but of the deep, subsurface storms we know little.

It has, therefore, been easy to compile a rather long list of hydrospheric anomalies. A few of the more interesting of these now follow:

- Dead water and slippery seas;
- Massive foam accumulations, sometimes arrayed in long parallel lines;
- The Caribbean "whitings";
- Old Faithful portrayed as a "strange attractor";
- Periodic springs and wells;
- The seasonal Guinea Tide;
- Gas-hydrate blow-outs;
- Ireland's "death waves";
- Downstream progressive waves; and
- Spiral and concentric ocean waves seen from orbit.

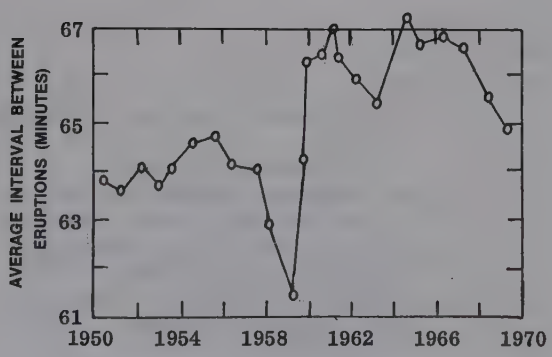
GHC UNUSUAL PHENOMENA OF WATER SURFACES

GHC1 Long, Parallel Foam Strips on Inland Waters (e.g.; the Dead Sea)
GHC2 Streaks, Slicks, Calm Patches
GHC3 Stratified Typhoon Waves
GHC4 Sudden Whitening of Dead Sea (Phenomenon develops in just a few hours.)
GHC5 Dead Water and Slippery Seas (Due to a low-density layer of surface water.) [GHTj]
GHC6 Bulging River Surfaces (e.g.; seen best on swiftly running rivers)
GHC7 Swiftly Traveling Surface Disturbances (Wind, fish, and insects have been ruled out.)
GHC8 Honeycomb Appearance of Flowing Water
GHCa Wind-created Stoppage of Niagra Falls
GHCb Multi-Kilometer Lines of Organisms and Biological Materials on Ocean Surfaces
GHCc Large, Unexplained Changes in Lake Levels [ETEa]
GHCd Strange, Unexplained Convection Patterns on Pond Surfaces
GHCe Massive Foam Accumulations
GHCf Storm "Footprints" on Ocean Surfaces (i.e.; as seen from satellites)
GHCg Curious Foam Patterns in Surf Zones
GHCh Kilometer-Size Spiral Patterns on Ocean Surfaces [GHWa]
GHCi Caribbean "Whitings": Immense White Streaks Seen from Space
GHCj Parting of the Red Sea (A moderate wind blowing for 10

hours or more will cause the north end of the Red Sea to recede a about a mile.)

GHG GEYSERS, PERIODIC WELLS, BLOWING CAVES

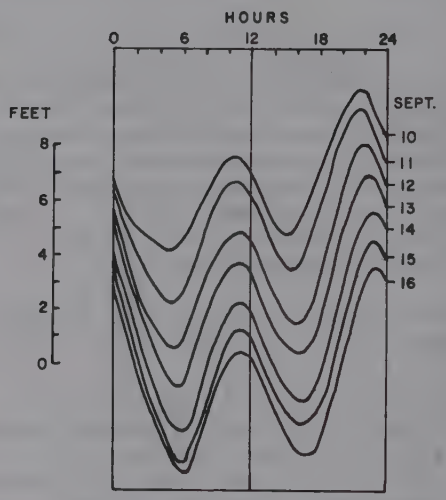
GHG1 Rhythmic Geysers at Sea (e.g.; Mediterranean, 1960, geysers 500 feet high)
GHG2 Geysers and Blowing Wells Correlated with Weather Phenomena (e.g.; "weather wells," sometimes equipped with whistles)
GHG3 Geysers and Intermittent Wells Correlated with Tidal Forces
GHG4 Cold-Water Geysers and Periodic Springs and Wells [GQH6]
GHGa Hydrothermal Earthquake Precursors (e.g.; geyser periods often change before nearby earthquakes) [GHGc]
GHGb Old Faithful as a "Strange Attractor" (i.e.; its performance is chaotic)
GHGc Effects of Distant Earthquakes on Periodic Geysers (The separation distance may be hundreds of miles.)
GHGd Mud Springs



Yearly averages of intervals between eruptions of Old Faithful, Yellowstone National Park, showing the effect of the 1959 Hebgen Lake earthquake of 1959. (Journal of Geophysical Research, 77: 342. 1972.) [GHGb]

GHS THE BEWILDERING VARIETY OF TIDES

GHS1 Sun-Dominated Tides (e.g., Tahiti, where high tides always occur about noon and midnight)
GHS2 Sea and Lake Seiches or Secondary Undulations



At Tuesday Island, in the Pacific, the tides are controlled by the sun instead of the moon. They occur at the same times every day. The same situation prevails at Tahiti. (Science News Letter, 61:278, 1952.) [GHS1]

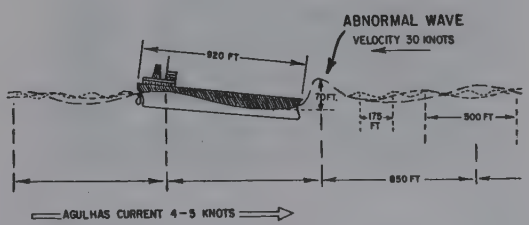
GHS3 Spectacular Tidal Bores (e.g.; Amazon River)
GHS4 Diurnal, Triple, and Quadruple Tides (e.g.; Stirling, Scotland, triple tides)
GHS5 Long-Period Tides of Unexpected Strengths (e.g.; the Guinea Tide, 14.7-day period) [GHT5]
GHS6 Tides That Precede the Moon (e.g.; Port Glasgow, Scotland, high tides often precede lunar meridian passage)
GHSa Extraordinary Tsunamis (e.g.; July 17, 1998, Papua New Guinea, tsunamis 14 meters high, 2,500 dead)
GHSb Wake Island Sealevel Oscillations
GHSc Claimed Tsunami Periodicity

GHT OCEAN TURBULENCE AND CIRCULATION PHENOMENA

GHT1 Extraordinary Deep Circulation Events (e.g.; undersea currents, vortices, "storms")
GHT2 Sonar-Detected Subsurface Oceanic Structures (e.g., plumes, spires, and walls of particulate matter)
GHT3 Nonvolcanic Underwater Eruptions (e.g.; Atlantic, 1963, aircraft observation of a hemispherical mound of water a mile across, hundreds of feet high)
GHT4 Anomalous El Ninos
GHT5 The Guinea Tide [GHS5]
GHT6 Energy Transfer to Hurricanes (Interesting, but nonanomalous, real-time observations)
GHT7 Long-Lived Oceanic Rings and Eddies (e.g.; the Meddies)
GHT8 Large-Scale Oceanic Chemical Anomalies
GHTa Curious Ocean Drifts (e.g., thousands of toy ducks from container-ship accident)
GHTb North Atlantic Oscillation (NAO)
GHTc Remarkable Ocean Current Rips (e.g.; 1992, Indian Ocean, a rip of disturbed water 100 meters wide stretched from horizon to horizon. Detected on radar at 11 miles.)
GHTd Gas-Hydrate Blowouts (e.g.; seafloor craters, North Sea) [ETCd, GSD1]
GHTe Powerful Oceanic Whirlpools and Vortices (e.g.; at 4° north in Pacific, anticyclonic eddy 500 kilometers in diameter)
GHTf Oceanic Megaplumes (These rise from deepsea vents to a height of a kilometer or so. They may be 2 kilometers in diameter.)
GHTg Cessation of Greenland Sea Convection
GHTh Gibraltar Water Exchange (The Mediterranean water flowing past Gibraltar is extremely salty because dammed rivers have reduced fresh-water input. This dense flow is apt to divert the warm Gulf stream, initiating an ice age in northern Europe. A barrage across the Strait is recommended.)
GHTi Gulf Stream Reversals (In 1928, two vessels reported this phenomenon between 40° and 50° west.
GHTj Dead Water [GHC5]
GHTk Curious, Regular Structure of Subsurface Bubble-Clouds
GHTl El Ninos Correlated with Seismicity
GHTm Oceanic Dead Zones (e.g.; Gulf of Mexico)

GHW REMARKABLE WAVE PHENOMENA

GHW1 Unexplained Solitary Waves (So-called "rogue waves." These are not tsunamis.)
1.1 Solitary Waves st Sea
1.2 Solitary Waves Impacting Shorelines (e.g.; Ireland's "death waves.")
GHW2 Periodic Bands of Waves (Best-developed in the Andaman and Sulu seas.)
GHW3 Sudden, Unexpected Onset of High Surf during Fair Weather (Usually attributable to powerful storms far out at sea.)
GHW4 Downstream Progressive Waves in Rivers (Like reversed tidal bores but due to heavy rains far upstream.)
GHWa Concentric Ocean Waves Seen from Space [GHCh]
GHWb Increasing Height of Atlantic Waves
GHWc Internal-Wave Phenomena at Gibraltar
GHWd Long Ocean Waves (i.e.; 1,000 kilometers or more in length)



Vessels often encounter giant waves in the Agulhas Current off the coast of South Africa. (Sea Frontiers, 22:106, 1976.) [GHW1]

GI INCENDIARY PHENOMENA

GIC CYCLIC FIRES
GIS FIRES OF SUSPICIOUS ORIGIN
GIW REMARKABLE FIRE STORMS

GIC CYCLIC FIRES

GICa Forest-Fire Cycles [GWR2]

GIS FIRES OF SUSPICIOUS ORIGIN

GISa Unexplained Fires [BHC7]
GISb Florida's Phantom Volcano

GIW REMARKABLE FIRE STORMS

GIWa The Peshtigo Horror [GWR2]

GL LUMINOUS PHENOMENA[1,5]

GLA	AURORA-LIKE PHENOMENA
GLB	BALL LIGHTNING
GLD	DIFFUSE ELECTRICAL DISCHARGE PHENOMENA
GLL	LIGHTNING ANOMALIES
GLM	LOW-LEVEL, METEOR-LIKE PHENOMENA
GLN	NOCTURNAL LIGHTS
GLW	MARINE PHOSPHORESCENT DISPLAYS

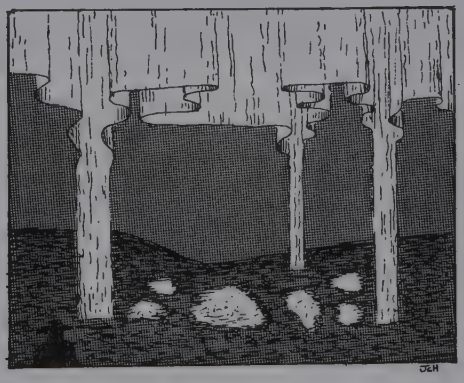
Nothing catches the eye faster than a mysterious light in the night. Of course, most of these luminosities yield to prosaic explanations, but assembled below are scores that are not so easily enfolded by scientific theories. The lights described here are self-luminous; like a light bulb they shine through the release of internal energy. They include lightning, auroras, meteors, nocturnal lights, and organized patterns of marine phosphorescence. Their diversity is to be seen in the sampling below:

- Auroras correlated with earthquakes;
- Auroras that approach the earth's surface;
- Black auroras;
- Ball lighting in its many guises;
- The famous "foo fighters";
- Mountain-top glows;
- Several varieties of earthquake lights;
- Sprites, blue jets, elves;
- Lightning superbolts;
- Many low-level nocturnal lights---often called "ghost lights"; and
- Marine light wheels and phosphorescent spinning crescents.

Note that rainbows, halos, and other optical phenomena requiring external sources of light are treated in Section GE.

GLA AURORA-LIKE PHENOMENA

GLA1	Auroral Pillars (i.e.; straight-sided, vertical shafts of light on one horizon)
GLA2	Sky-Spanning Auroral Arches
GLA3	Auroral Meteors (e.g.; rapidly moving patches of light)
GLA4	Low-Level Auroras (These seem to descend all the way to the ground.) [GLA21]
GLA5	The Odor of the Aurora (e.g.; the smell of ozone, sulphur, "electricity")
GLA6	Artificial Low-Level Auroras (e.g.; Lemstrom's 1881 experiments)
GLA7	Geographically Displaced Auroras (e.g.; southern North America)
GLA8	Auroras with Unusual Geometries



Saskatchewan, 1938. An apparent low-level auroral display. Auroral streamers seemed to descend to the ground from the curtains above. White, luminous patches drifted along the surface of the ground. (Royal Astronomical Society of Canada, Journal, 32:451, 1938. [GLA4]

GLA9 Auroras Correlated with Thunderstorms

GLA10 Auroras Correlated with Earthquakes [GLD8]

GLA11 Auroras Correlated with Meteors (Meteors seem sometimes to stimulate or extend auroras.)

GLA12 Close Relationship between Aurora Displays and Clouds
- 13.1 Morning Cloud Shapes Resemble Auroral Geometry
- 13.2 High Hazes Sometimes Form after Auroral Displays
- 13.3 Halo Phenomena Increase during and after Auroral Activity
- 13.4 Stars Twinkle More during Auroral Activity

GLA13 Glowing Night Skies (i.e.; bright, milky-white, moonless nights)

GLA14 Transient Sky Brightenings (i.e.; bright, all-sky, bluish flashes lasting 1 to several seconds) (Obviously, meteors must be absent for this to be a unique phenomenon.)

GLA15 Bright, Luminous Patches on the Horizon (These sometimes transform into large expanding disks of light.)

GLA16 Weather or Storm Lights (Luminous whitish of reddish patches on the horizon. Said by folklore to presage sharp weather changes. Note the resemblance to GLA15.)

GLA17 Curious Folklore: Auroras and Silken Threads [GQH3]

GLA18 Correlation of Aurora Frequency with Lunar Phase

GLA19 Auroras Apparently Physically Interacting with Lunar Halos [GLA12]

GLA20 Electrical Effects of Auroras at the Earth's Surface
- 20.1 Human Physiological Effects
- 20.2 Suppression of Radio Reception
- 20.3 Currents Induced in Long Terrestrial Conductors
- 20.4 Mineral Fluorescence

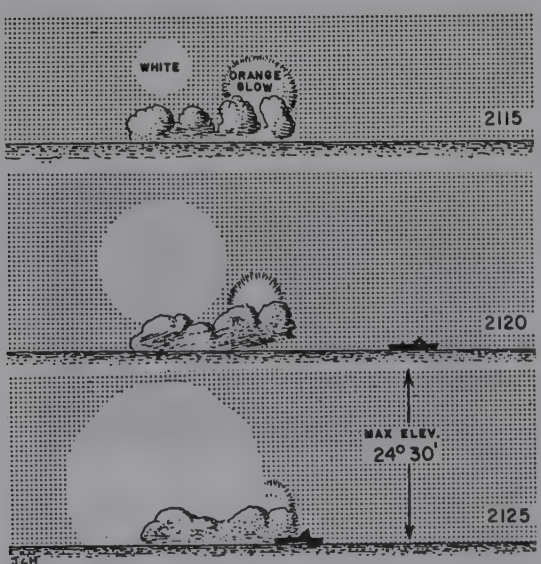
GLA21 Auroras and Seemingly Luminous Surface Fogs (Usually associated with low-level auroras.) [GLA4]

GLA22 Black Auroras (i.e.; like a photographic negative of normal auroras) (Strangely enough, these are well-verified by science.)

GLA23 Banded Skies (Luminous, parallel bands or stripes extending horizon-to-horizon.) [GLA2, GLA12, GWC3]

GLA24 Millisecond Brightness Pulsations of the Night Sky

GLA25 False Dawn [GELa]



This ghostly, expanding white disc was observed over the Atlantic in 1976. (Marine Observer, 47:66, 1977.) [GLA15]

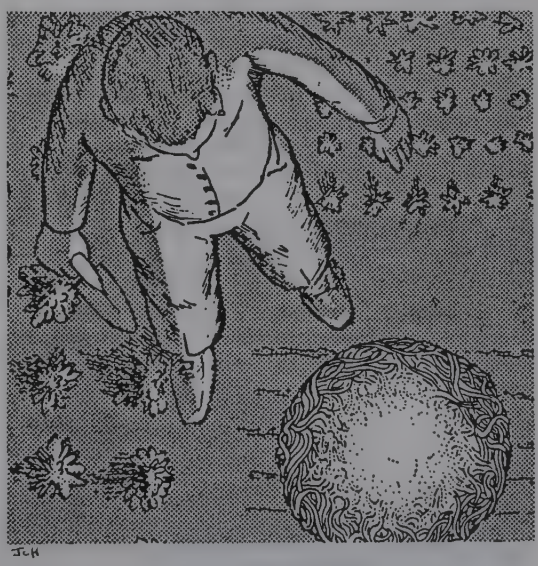
In 1933, six luminous bands cerossed the English skies in an east-west direction. (British Astronomical Association, Journal, 44:27, 1933.) [GLA23]

GLA26 Auroras Aligned with Coastlines
GLA27 Challenges to Theories of Aurora Origin
GLA28 Flash Auroras (i.e.; random, seconds-long, auroral streamers and patches)
GLA29 Possible Atmospheric Laser Emission Accompanying Auroras
GLA30 Mysterious Bright Streaks in the Sky (The streaks consist of luminous dashes all moving in the same direction.)
GLA31 Short-Lived, Bright Patches High in the Sky (Virtually all such observations can be correlated with rocket launches.)

GLB BALL LIGHTNING

GLB1 "Ordinary" Ball Lightning (i.e.; mobile yellowish balls, 5-15 inches in diameter, with lifetimes from a few seconds to several minutes)
GLB2 Ball Lightning with Spikes
GLB3 Ball Lightning with Rays
GLB4 Rod-Shaped Ball Lightning
GLB5 Double and Triple Ball Lightning
GLB6 Miniature Ball Lightning (i.e.; diameter less than 1 inch)
GLB7 Giant Ball Lightning (i.e.; diameter 3-60 feet)
GLB8 Transparent Ball Lightning
GLB9 Fragmenting Ball Lightning
GLB10 Materialization of Ball Lightning in Enclosures
GLB11 Black Ball Lightning (Apparently ordinary ball lightning surrounded by a smoky, opaque layer.) [GLL14]
GLB12 Ball Lightning's Electromagnetic Effects (Besides its danger to lifeforms, ball lightning affects compasses and automobile ignition systems.) [GLL32]
GLB13 Ball Lightning with Apparent Internal Structure (i.e.; a "wormy" interior)

In 1975, ball lightning measuring about 5 feet in diameter was observed near Albany, New York, (Weather, 31:68, 1976.) [GLB7]



In 1940, ball lightning with a "wormy" surface materialized in an English garden. (Weather, 19:228, 1961.) [GLB13]

GLB14 Unusual Physiological Effects of Ball Lightning (e.g.; headaches, nausea, memory loss, disorientation)
GLB15 Artificial Ball Lightning (High-current electrical apparatus sometimes creates luminous spheroids.)
GLB16 Ball Lightning with Long Tails
GLB17 Correlation of Ball Lightning Incidence with Solar Activity
GLB18 Ball Lightning External to

Aircraft (The so-called Foo Fighters of World War II may have been ball lightning.)

GLB19 Repeating Ball Lightning (i.e.; repeats in the same areas)

GLB20 Penetration of Physical Barriers by Ball Lightning (Sometimes holes are made in window panes, sometimes not.)

GLB21 Miscellaneous Observations of Bizarre Ball Lightning (i.e.; ball lightning behaving like a fluid)

GLD DIFFUSE ELECTRICAL DISCHARGE PHENOMENA

GLD1 Mountain-Top Glows (e.g.; the Rockies and, especially, the Andes Glow)

GLD2 Claims of Intermountain Electric Discharges

GLD3 Large-Scale St. Elmo's Fire (i.e.; the envelopment of people, buildings and large tracts by flame-like discharges)

GLD4 Moving, Surface-Level, Electrified Light Patches (Several feet in extent, these may pass like waves over people and objects.)

GLD5 Discharge Phenomena during Duststorms and Snowstorms

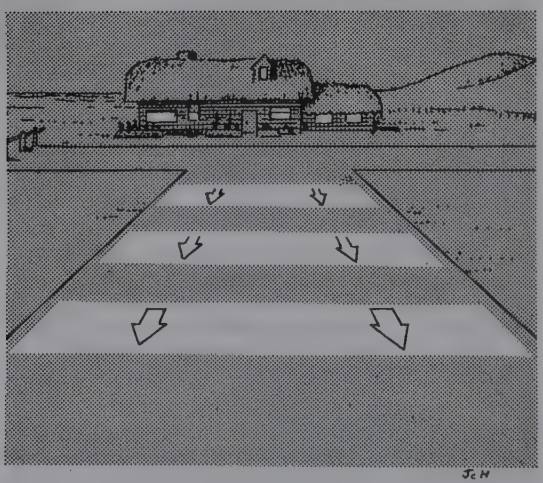
GLD6 Unusual Forms of St. Elmo's Fire (e.g.; small balls running along railroad tracks)

GLD7 Luminous Aerial Bubbles (Looking like toy balloons or soap bubbles, hundreds may fill the air.) [GLN1]

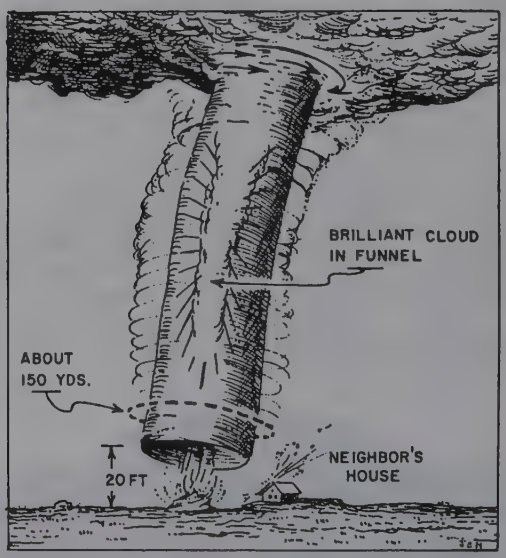
GLD8 Earthquake Lights (i.e.; sky flames, ground flames, aurora-like phenomena) [GLA10]

GLD9 Volcano Lights (e.g.; besides the usual lightning, expanding luminous arcs)

GLD10 Tornado Lights (e.g.; glowing columns inside the funnel)



Midlothian, England, 1885. Waves of light swept across the ground. Note the resemblance to GLW2. (Nature, 32:316, 1885.) [GLD4]



Blackwell, Oklahoma, 1955. A powerful tornado seemed to contain a bright, self-luminous cloud within its funnel. (Monthly Weather Review, 83:109, 1955.) [GLD10]

GLD11 Old Anecdotes of Whirlwinds of Fire and Smoke

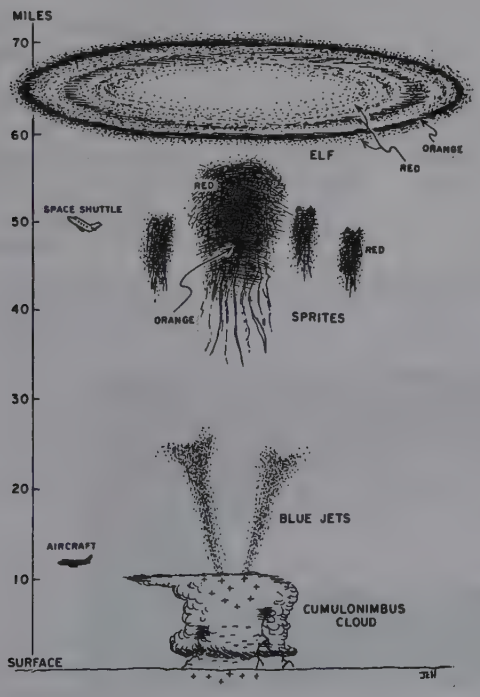
GLD12 Anomalous Flashes Detected by Satellites (These are distributed randomly, suggesting they are not lightning.)

GLD13 Enhanced Luminosity of Rocks (i.e.; during quakes and electrical storms)

GLD14 Luminous Phenomena in Water and Ice (e.g.; light flashes at bases of waterfalls and in sea ice that is breaking up)
GLD15 Dazzling Lights in and on Clouds
GLD16 Luminous Patches Moving on Cloud Surfaces
GLD17 Ground-Level Light Flashes (Anecdotal evidence only.)

GLL LIGHTNING ANOMALIES

GLL1 Luminous Phenomena Occurring above Thunderclouds (Originally termed "rocket lightning," scientists now recognize four other distinct phenomena)
1.1 Sprites
1.2 Blue jets
1.3 Elves
1.4 Blue starters
1.5 Rocket lightning (i.e.; upwardly directed lightning)



Composite sketch of three types of luminous phenomena that sometimes occur above strong thunderstorms. (Science News. 148:421, 1995.) [GLL1]

GLL2 Bead Lightning
GLL3 Unusual Colored Lightning (i.e.; yellow, red, blue, green)
GLL4 Silent Lightning
GLL5 Horizontal Lightning
GLL6 Lightning from a Clear Sky
GLL7 Crown Flash (i.e.; the brightening of a thunderhead cloud followeed by aurora-like streamers directed upward) [GLL1]
GLL8 Preference of Lightning for Certain Trees (e.g.; oaks preferred, beeches avoided)
GLL9 Lightning Figures (Branching patterns appeared on people struck by lightning.)
GLL10 Lightning Sounds (Other than Thunder) (i.e.; clicks and ripping sounds)
GLL11 Lightning's Pranks (e.g.; breaking every other plate in a pile)
GLL12 Hot-Air Blasts Following Lightning Strokes
GLL13 Unusual Geographical Preferences of Lightning (e.g.; much more common over land than over the sea)
GLL14 Black Lightning (Probably due to retina fatique.) [GLA22, [GLB11]
GLL15 Slow or Prolonged Lightning
GLL16 Correlation of Lightning and Cosmic Rays
GLL17 Lightning Superbolts (i.e.; estimated as 100 times more energetic than normal)
GLL18 Cyclic Flashing of Lightning
GLL19 Dual Lightning Discharges (i.e.; two simultaneous discharges far apart)
GLL20 Abnormally Long Lightning Strokes (i.e.; on the order of 100 miles long)
GLL21 Anomalous Electrical Phenomena Induced by Lightning
GLL22 Lightning Shadowgraphs (i.e.; these occur on exposed surfaces and quickly fade)
GLL23 Wisps of Flame Left by Lightning Strokes
GLL24 Tubular Lightning (e.g.; channels 18 feet in diameter have been photographed)
GLL25 Meandering Lightning
GLL26 Ribbon Lightning
GLL27 Spoked and Spider Lightning
GLL28 Bipolar Nature of Large Electrical Storms

GLL29 Gamma-Ray Flashes in Thunderstorms
GLL30 Neutron Generation in Lightning Bolts
GLL31 Unusual (Usually Deadly) Interactions between Lightning and Humans
GLL32 Effects of Lightning on Vehicle Engines (i.e.; stalling) [GLB12]

GLM LOW-LEVEL, METEOR-LIKE PHENOMENA

GLM1 Low-Level Meteor-Like Objects
GLM2 Darting Gleams of Light (These are termed "sleeks.")

GLN NOCTURNAL LIGHTS

GLN1 Low-Level Nocturnal Lights: (Spook lights, Marfa lights. Brown Mountain lights, etc.) [GLD7]
GLN2 High-Level Nocturnal Lights (Non-Meteoric) [AYO]

GLW MARINE PHOSPHORESCENT DISPLAYS

GLW1 Long, Parallel, Stationary Phosphorescent Bands
GLW2 Moving, Parallel Bands of Phosphorescence
GLW3 Aerial Phosphorescent Displays

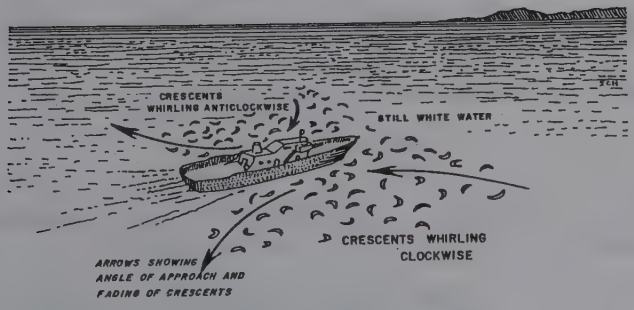
High-speed bars of light approached a vessel in the East Indian Archipelago in 1959. A rotating phosphorescent light wheel can be seen in the distance. (Marine Observer, 30:128, 1960.) [GLW2, GLW4]

GLW4 Marine Phosphorescent Wheels (These are spoke-like, often a mile in diameter, and spin. Several may appear simultaneously.)
GLW5 Expanding Phosphorescent Rings
GLW6 Phosphorescent Patches Moving in Circles
GLW7 Phosphorescent Spinning Crescents
GLW8 Zigzag Phosphorescent Flashes
GLW9 White Water or Milky Sea (The whole ocean may be so bright that the sky appears black.)

Mexico's Kino Light is reputed to be a stationary blue glow that one can walk into with impunity. This is an artist's concept based upon several informal reports. (Fate, 23:63, June 1970.) [GLN1]

GLW10 Radar-Stimulated Phosphorescent Displays
GLW11 Te Lapa: Underwater Lightning
GLW12 Moving, V-Shaped, Phosphorescent Displays
GLW13 Colored Rays Emanating from Ships
GLW14 Radar Detection of Phosphorescence
GLW15 Deep-Sea-Vent Glows

Gulf of Thailand, 1953. Three overlapping marine light wheels were observed spinning simultaneously. (Marine Observer, 24:73, 1954.) [GLW4]



In 1951, a vessel's radar initiated a display of phosphorescent spinning crescents in the Gulf of Oman. (Marine Observer, 22:190, 1952.) [GLW7]

GQ SOME STRANGE PHENOMENA OF EARTHQUAKES[3]

GQB ANIMAL RESPONSES TO EARTHQUAKE PRECURSORS
GQG EARTHQUAKE GEOGRAPHICAL ANOMALIES
GQH UNUSUAL DYNAMIC PHENOMENA ASSOCIATED WITH EARTHQUAKES
GQM ELECTRICAL AND MAGNETIC PHENOMENA OF EARTHQUAKES
GQS EARTHQUAKE PERIODICITIES
GQV UNUSUAL VIBRATIONS
GQW EARTHQUAKE WEATHER

Earthquakes are sudden and often powerful distortions of the earth's crust; and it is to be expected that some unusual phenomena will occur, especially near a quake's epicenter. Many of these phenomena involve the gases, liquids, and finely divided solids contained within or resting upon the crust's surface. These substances may be squeezed out or agitated in bizarre ways. Such phenomena are often observed thousands of miles from quake epicenters.

Also of interest to the anomalist are earthquake precursors and the possible correlations of earthquakes with astronomical events and terrestrial weather.

By way of introduction to this section we list a few representative "GQ" phenomena:

- Unusual animal behavior preceding quakes;
- Seismic gaps where earthquakes seem likely but do not occur;
- Slow earthquakes;
- Earth currents affected or created by quakes;
- Earthquakes correlated with sunspots, the moon, and other astronomical phenomena;
- The tendency of earthquakes to occur at night; and
- Earthquake "weather" (wind gusts, fog, etc.).

See GLD8 for earthquake lights. Earthquake seiches (lake disturbances) are well-explained and are omitted here.

GQB ANIMAL RESPONSES TO EARTHQUAKE PRECURSORS

GQB1 Anomalous Animal Activity before Earthquakes (i.e.; cats, cattle, etc. become agitated) [BMT4, BRTj]

GQB2 Human Sensations Experienced before and during Earthquakes (e.g.; giddiness, nausea, disorientation) [BHTb]

GQG EARTHQUAKE GEOGRAPHICAL ANOMALIES

GQG1 Seismic Activity Occurring on Great Circles

GQG2 Earthquake-Prone Areas Uncorrelated with Geology

GQGa Seismic Gaps (i.e.; fault zones where earthquakes quakes seem likely but are absent) [EQQc]

GQGb Distant Sympathetic Earthquakes [EQQg]

GQGc Earthquake Prediction: Successes and Failures

GQH UNUSUAL DYNAMIC PHENOMENA ASSOCIATED WITH EARTHQUAKES

GQH1 Upward Propulsion of Objects (e.g.; upthrown rocks)
GQH2 Violent Expulsion of Solids from the Earth (e.g.; sand blows)

Sand-blows created during the 1812 New Madrid earthquake. (Journal of Geology, 13:45, 1905.) [GQH2]

GQH3 Supposed Appearance of Hairs after Earthquakes (An old Chinese belief.) [GLA17]
GQH4 Gaseous Emissions prior to and during Earthquakes
GQH5 Traveling Strain Events (These are seen in strain sensors and the progression of successive earthquakes.)
GQH6 Effect of Earthquakes on Geyser Periods [GHGc]
GQHa Slow, Silent Earthquakes [EQQe]

GQM ELECTRICAL AND MAGNETIC PHENOMENA OF EARTHQUAKES

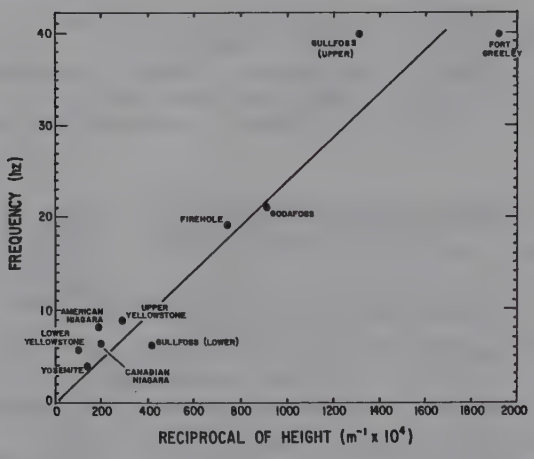
GQM1 Earthquake Magnetic Effects (e.g.; disturbances of magnetometers measuring the geomagnetic field)
GQM2 Earth Currents Observed during Earthquakes (i.e.; in monitoring stations and buried, long conductors)
GQM3 Radio Emissions Associated with Earthquakes
GQM4 Electrostatic Effects Correlated with Earthquakes (e.g.; sparking, electrical shocks)

GQS EARTHQUAKE PERIODICITIES

GQS1 Earthquakes Correlated with Solar Activity
GQS2 Earthquakes Correlated with the Moon's Position
GQS3 Reported Appearance of Meteors during Earthquakes
GQS4 Annual Variation of Earthquake Frequency
GQS5 Diurnal Variation of Earthquake Frequency
GQS6 A 42-Minute Period in Quakes
GQS7 Earthquake Activity Correlated with Planetary Positions [GEL4, GER11, GWS8]
GQS8 Seismic Activity Correlated with Pulsar Radiation
GQS9 Earthquakes Correlated with other Periodic Phenomena (e.g.; fish catches)
GQS10 Earthquakes Correlated with Polar Wobble
GQSa Earthquakes Correlated with the Earth's Rotation
GQSb Earthquake Cycles [GQS4-GQS7]
GQSc Chaos in Earthquake Data
GQSd Nocturnal Earthquakes More Common Than during the Day
GQSe Earthquakes Correlated with Atmospheric Pressure
GQSf Earthquakes Correlated with Solar and Lunar Eclipses

GQV UNUSUAL VIBRATIONS

GQV1 Unidentified Vibrations (e.g.; muted ground vibrations) [GSH5]
GQV2 Vibrations Induced by Falling Water (e.g.; vibrating dams)
GQV3 Vibrations of Polar Ice (e.g.; ice on the Chukchi Sea)
GQVa Exotic Seismic Signals (e.g., huge rock falls, bolide impacts)
GQVb Strong Subterranean Rumblings Unrelated to Seismic Activity
GQVc Periodic Signals Detected by Gravitational-Wave Detectors



Waterfall vibration frequency depends upon waterfall height. (Science, 164: 1513, 1969.) [GQV2]

(True gravity waves have not yet been detected, so these signals are probably mundane and human-made.) [CFGa]

GQVd Whole-Earth Hums [EQQb]

GQW EARTHQUAKE WEATHER

GQW1 Earthquake Weather (e.g., oppressive conditions)

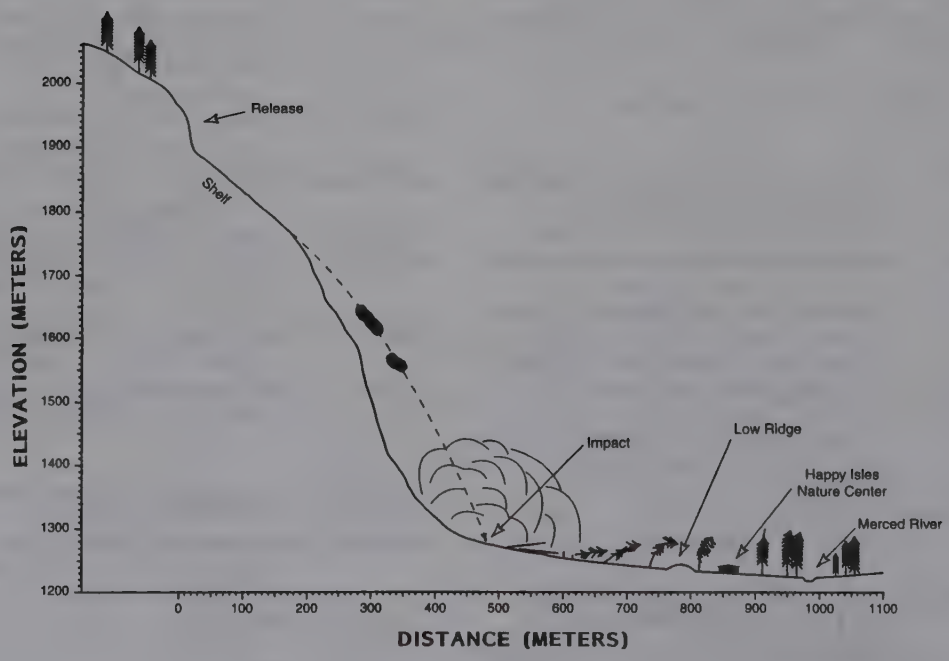
GQW2 Earthquakes Associated with Sudden Storms

GQW3 Rainfall Correlated with Earthquake Frequency

GQW4 Wind Gusts and Earthquakes (These strike at or just before the main shocks.) [GWS2]

GQW5 Fogs Associated with Quakes (Possibly auroral fogs or precursor gas releases.) [GLA10, GLA21]

GQWa Earthquakes Correlated with Clouds



Yosemite National Park, California, 1996. Huge rock fall generated winds of about 245 miles/hour (110/m/s) that felled trees and killed one person. A dense sand cloud following tore bark off trees. (Geological Society of America, Bulletin, 112:75, 2000.) [GQW4]

GS UNUSUAL SOUNDS IN NATURE[3]

GSD EXTRAORDINARY DETONATIONS
GSE ANOMALOUS ECHOS
GSH ANOMALOUS HISSING AND RUSHING SOUNDS
GSI INFRASOUND
GSM MUSICAL SOUNDS IN NATURE
GSO ENIGMATIC UNDERWATER SOUNDS
GSU UNDERGROUND SOUNDS
GSW UNUSUAL BAROMETRIC DISTURBANCES

When the literature research on scientific anomalies began in the late 1960s, it was not anticipated that so many anomalous and curious sounds would be found. It was, therefore, quite surprising when the natural world was discovered to be full of unexplained hums, detonations, and even natural music---all detectable by the human ear. Beyond our hearing range, there are ultrasound, infrasound, and very-long-period airwaves. The select list that now follows will hopefully entice the reader to examine the full, detailed roster of mysterious and perplexing natural sounds.

- The Barisal Guns, the Lake Seneca Guns, mistpouffers, etc.
- The "electrophonic sounds" emitted by the aurora and high-altitude meteors;
- Pervasive hums of unknown origin, such as that in the environs of Taos, New Mexico, and other spots;
- A panoply of unidentified undersea sounds, some biological, some geophysical;
- Musical valleys and waterfalls; and
- "Natural melodies" played by the wind and waves.

GSD EXTRAORDINARY DETONATIONS

GSD1 Explosive Sounds Heard near Bodies of Water ("Waterguns") (e.g.; mistpouffers, the Barisal Guns)
GSD2 Detonations Heard in Seismically Active Areas (e.g.; rockbursts)
GSDa Unidentified Aerial Detonations (Unseen meteors and supersonic aircraft likely sources.)

GSE ANOMALOUS ECHOS

GSE1 Aerial Echos (This term is applied to the echos heard from a sea horizon of sounds emanating from ships.)
GSE2 Musical Echos (Analyzed Sound) (i.e.; discordant sounds made pleasing by nature) (e.g.; so-called "musical valleys") [GSM3, GSMc]

GSH ANOMALOUS HISSING AND RUSHING SOUNDS

GSH1 Hissing Sounds Preceding Earthquakes [GSUa]
GSH2 Hissing Sounds Correlated with High-Altitude Meteors (So-called "electrophonic sound.") [GSH3]
GSH3 Swishing and Crackling Sounds Associated with the Aurora (Also "electrophonic sound.") [GSH2]
GSH4 Overhead Rushing Sounds of Undetermined Origin
GSH5 Unidentified Humming Sounds (e.g.; the Taos hum) [GQV1]
GSH6 Nighttime Hums in the Desert
GSHa Hums Produced by Fishes (Many fish are noisy, and they can be heard at sea and seashore. Obviously not anomalous.) [BFTh]

GSI INFRASOUND

GSI1 Unidentified Infrasound Sources (Known sources include: volcanos, ocean surf, wind blowing across mountain crests, auroras, meteors, storms, earthquakes)

GSM MUSICAL SOUNDS IN NATURE

GSM1 Underwater Musical Sounds (e.g.; humpback whales) (However, many common, still-mysterious sounds are picked up by underwater listening equipment.) [GSO]
GSM2 Subterranean Organ-Like and Horn-Like Sounds
GSM3 Natural Melody (e.g.; wind blowing through trees and other vegetation, wind blowing across some rock formations, such as "The Snorers" in the Harz mountain, Spain.) [GSMb]
GSMa Musical Fences and Ship's Rigging
GSMb Musical Waterfalls (Sound of falling water probably modified by surrounding cliffs and vegetation.) [GSM3]
GSMc Musical Valleys [GSM3]

GSO ENIGMATIC UNDERWATER SOUNDS

GSOa Crackling Seas
GSOb Single-Frequency Notes
GSOc Underwater Thumps [GSM1]
GSOd Passive-Sonar Imaging

GSU UNDERGROUND SOUNDS

GSUa Roars and Whistles [GSM2]
GSUb Machine-Like Sounds [GSH5]

GSW UNUSUAL BAROMETRIC DISTURBANCES

GSW1 Unidentified Air Waves
GSW2 Earthquake-Generated Air Waves [GQW4]
GSW3 Meteor-Generated Air Waves (Not considered anomalous.)
GSWa Solitary Waves in the Atmosphere and Ionosphere
GSWb Volcano-Produced Pressure Waves (Not considered anomalous.)
GSWc Eclipse Wind [GWSa]

GW WEATHER PHENOMENA[2]

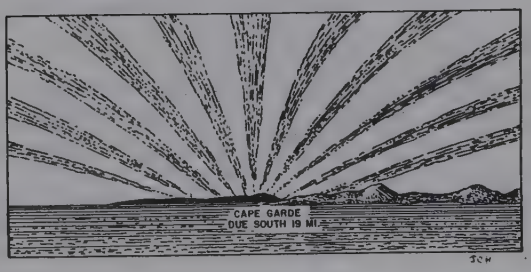
GWC	UNUSUAL CLOUDS
GWD	DARK DAYS, FOGS, AND OTHER OBSCURATIONS
GWF	FALLS
GWH	LARGE STORM SYSTEMS
GWP	AMOMALOUS PRECIPITATION
GWR	TEMPERATURE ANOMALIES
GWS	WEATHER AND ASTRONOMY
GWT	THE IDIOSYNCRACIES OF TORNADOS AND WATERSPOUTS
GWW	WHIRLWINDS AND DUST DEVILS

"Weather" is a composite experience of sight, sound, temperature, and other physiological sensations. The luminous aspects of weather are dealt with in Sections GE and GL. Here, we are concerned with clouds, fogs, winds, precipitation, temperature, and storms. With such a large group of highly variable and unpredictable phenomena, there are bound to be many unusual, often-inexplicable, observations on record in the science journals. Consider as appetizers the following phenomena:

- Polar-aligned cloud bands;
- Green clouds;
- Dark days when the sun is completely blotted out the entire day;
- The falls of fish and hydrometeors;
- Conical snowflakes and crystalline hail;
- The "year without a summer" (1816);
- Thunderstorms correlated with solar activity;
- The electrical effects of tornados; and
- The explosive onset of whirlwinds.

GWC UNUSUAL CLOUDS

GWC1	The White-Sky Phenomenon (i.e.; sun and stars dimmed) (e.g.; Summer 1912, most of Northern Hemisphere)
GWC2	Cloud Arches (i.e.; connecting two far-separated clouds)
GWC3	Polar Bands (i.e.; parallel lines of clouds aligned north and south) [GLA12, GLA23]
GWC4	Miniature Thunderclouds (i.e.; low-level and only a few hundred meters across)
GWC5	Noisy Clouds (i.e.; hissing, crackling, but not electrical in origin)
GWC6	Noctilucent Clouds
GWC7	Ring Clouds
GWC8	Thunderclouds Affecting the Ionosphere
GWC9	Circular Holes in Cloud Decks



Polar-aligned cloud bands observed over the Mediterranean. (Marine Observer, 5:203, 1928.) [GWC3]

GWC10 Anomalous Cloud Lines (i.e.; these may be hundreds of miles long) [GWC3, GWC12]
GWC11 Folklore Claim of Dispersal of Clouds by the Moon
GWC12 The Morning Glory Phenomenon and Other Roll Clouds
GWC13 Long, Hollow, Cylindrical Clouds
GWC14 Cloud Spokes Radiating from Thunderclouds
GWC15 Excess of Ice Crystals in Cumulus Clouds
GWC16 Cloud Brightness Changes
GWC17 Anomalous High-Altitude Haze
GWCa Strange Arctic Plume Clouds
GWCb Stratospheric Water Streams and Reservoirs
GWCc Stratospheric "Holes" and the Icy-Minicomet Theory
GWCd Bizarre Clouds That Defy Reasonable Explanations (e.g.; rotating ring of smaller clouds 80-100 meters in diameter. Period of rotation: 1 minute.)
GWCe The "Mystery Cloud" of April 9, 1984
GWCf Green Clouds [GWHc]
GWCg Ozone Clouds
GWCh High-Altitude Dust and Biological Materials
GWCi Upside-Down Thunderclouds
GWCj Sodium and Bromine Clouds
GWCk Clouds Correlated with Cosmic Ray Level

GWD DARK DAYS, FOGS, AND OTHER OBSCURATIONS

GWD1 Dark Days (i.e.; days so dark the stars are visible) (e.g.; November 6-10, eastern North America)
GWD2 Pogonips and Other Ice Fogs
GWD3 Mists Correlated with Epidemics (e.g.; cholera, England, 1832, 1848, 1854, 1866)
GWD4 Dry Fogs and Dust Fogs (e.g.; the famous Cape Verde dust fogs extend far out to sea)

GWF FALLS

GWF1 Ice Falls or Hydrometeors [GWP5]
GWF2 Claims of Stone Falls (e.g.; "thunderstones")
GWF3 Extensive Sulphur/Pollen Falls
GWF4 Falls of Miscellaneous Inorganic Substances (e.g., salt, magnetic spherules, coal)
GWF5 The Fall of "Manna" (i.e.; evidently a natural edible substance from trees in the Middle East)
GWF6 Unusual Falls of Hay and Leaves (i.e.; from great heights in a clear sky)
GWF7 Gelatinous Meteors or Pwdre Ser
GWF8 Prodigious Falls of Web-Like Material (So-called "angel hair".)
GWF9 Massive Falls of Miscellaneous Organic Substances (e.g.; berries, feathers, seeds)
GWF10 Fish Falls (Abundant anecdotes, some by scientists)
GWF11 Falls of Frogs and Toads
GWF12 Insect Falls
GWF13 Bird Falls (In large numbers, often dead.)
GWF14 Falls of Miscellaneous Living Animals (e.g.; shellfish, snakes, lizards, etc.)
GWFa Liquids and Goo
GWFb Sewage

GWH LARGE STORM SYSTEMS

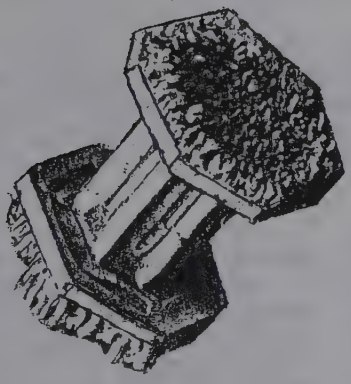
GWH1 Ozone in Hurricanes
GWH2 Hurricane Geographical Anomalies (e.g.; nonexistence of Hurricanes in South Atlantic)
GWH3 Large Thunderstorm Systems (These may extend for hundreds of miles.)
GWHa Origin of Polygonal Eye-Walls in Hurricanes
GWHb Upper-Atmosphere Wind Storms
GWHc Green Thunderstorms [GWCf]
GWHd Unexplained Hurricane Fine Structures (Small tubes of rotating wind a few hundred meters in diameter. However, these cylinders were horizontal!)
GWHe Hypercanes (Applied to hurricanes with winds approaching the speed of sound. No examples given.)

GWP AMOMALOUS PRECIPITATION

GWP1 Precipitation from a Clear Sky
GWP2 Giant Snowflakes (i.e.;plate-like masses up to 38 centimeters in diameter)

Agglomerations of snowflakes 38-centimeters in diameter fell in Montana on January 28, 1887. (Monthly Weather Review, 43:73, 1915.) [GWP2]

GWP3 Conical Snowflakes
GWP4 Hailstones with Anomalous Shapes (e.g.; crystalline masses, tetrahedrons, flat plates)



A bizarre form of snow. Hexagonal symmetry can be seen in end plates and connecting columns, but the "iceworms" projecting from the plates are strange to say the least. (Science, 289:503, 2000.) [GWP4]

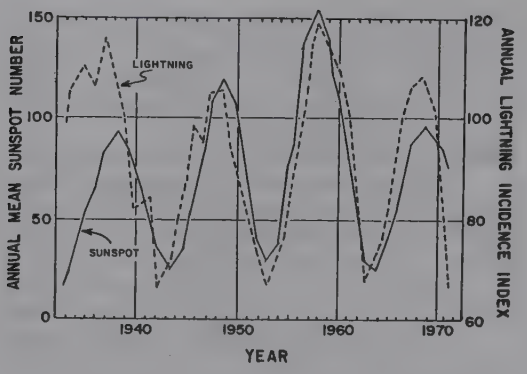
GWP5 Giant Hailstones (i.e.; over 1 inch in diameter) (e.g.; 4 inches in diameter, ship in Persian Gulf, 1962) [GWF1]
GWP6 Hail Strewn Patterns (i.e.; in long strips or geometrically arranged patches)
GWP7 Slowly Falling Hail
GWP8 Unusual Inclusions in Hail (e.g.; a small turtle)
GWP9 Explosive Hail (i.e.; hail that fragments with pistol-like reports)
GWP10 Colored Precipitation (i.e.; yellow is common because of included pollen, but other colors rare)
GWP11 Luminous Precipitation (i.e.; flashes of light emitted upon impact)
GWP12 Point Precipitation (Many inches may fall upon just a few acres.)
GWP13 Surplus Ice Crystals in Clouds
GWP14 Decrease of Rainfall with Increasing Altitude
GWP15 Rain Gushes Associated with Lightning
GWPa Rainfall Correlated with Meteor Showers
GWPb Puzzle of Snowflake Symmetry
GWPc Abnormal Frequency of Weekend Rain
GWPd Rainfall Correlated with Soil Type

GWR TEMPERATURE ANOMALIES

GWR1 Temperature Flashes (i.e.; tens of degrees within a few minutes)
GWR2 Incendiary Phenomena (e.g., firestorms, such as the Peshtigo Horror) [GIWa]
GWRa Weekdays Warmer than Weekends
GWRb The Year without a Summer (1816, northern North America, heavy snows in June, early crops frozen.)

GWS WEATHER AND ASTRONOMY

GWS1 Correlation of Lunar Phase and Terrestrial Weather
GWS2 Correlation of Lunar Phase and Thunderstorms
GWS3 Thunderstorms Correlated with Solar Activity



Lightning frequency compared with sunspot number. (Nature, 249:332, 1974.) [GWS3]

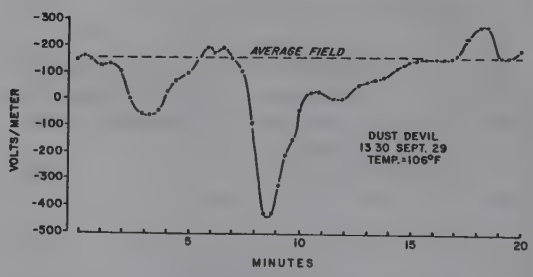
GWS4 Effects of Meteors on Weather i.e.; apparent peaking of rainfall about 30 days after prominent meteor showers)
GWS5 Correlations between Solar Activity and Weather
GWS6 Influence of Lunar Phase on Atmospheric Ozone
GWS7 The Lunar Temperature Effect
GWS8 Purported Effect of the Planets on the Weather [GER11]
GWS9 Folklore Links Comets with Bad Weather
GWSa Eclipse Winds (i.e.; wind gusts preceding totality) [GSWc]

GWT THE IDIOSYNCRACIES OF TORNADOS AND WATERSPOUTS

GWT1 The Tornado as an Electrical Machine [GWT2]
GWT2 Burning and Hydration during Tornados
GWT3 Tornados and Waterspouts with Horizontal Funnels
GWT4 Multiwalled Waterspouts
GWT5 Anomalous Historical Incidence of Tornados (i.e.; the marked increase in the United States 1950-1973)
GWT6 Apparent Reversal of Rotation in Waterspouts
GWT7 Pranks of the Tornado (e.g.; defeathering chickens)
GWT8 Tornado Incidence Correlated with Magnetic Variation
GWT9 Landspouts or Dustspouts
GWT10 Waterspouts between Clouds
GWT11 Forked Waterspouts
GWT12 Abnormally Thin Waterspouts
GWT13 Waterspout Funnel-Knots
GWT14 Bull's-Eye Squalls (i.e.; strong whirlwinds that descend from a clear sky) [GWTa]
GWTa Destructive Downbursts [GWT14]
GWTb Tornado Origin Correlated with Lightning Frequency
GWTc Tornado Frequency Correlated with Automobile Traffic
GWTd Long-Distance Transport of Objects by Tornados
GWTe Tornados Correlated with Oil Deposits

GWW WHIRLWINDS AND DUST DEVILS

GWW1 Explosive Onset of Whirlwinds
GWW2 Pranks of Whirlwinds and Dust Devils
GWW3 Steam Devils (i.e.; rotating fingers of vapor rising from cold waters, often arranged in a geometrical pattern)



The electric field of a passing dust devil as measured in New Mexico. (Journal of Geophysical Research, 69:5427, 1964.) [GWW4]

GWW4 Electrical Properties of Whirlwinds and Dust Devils
GWW5 Energetic Miniature Vortices (i.e.; a few feet in diameter and as high as a person)
GWWa Whirlwinds and Simple Crop Circles [XCZ]
GWWb Whirlwind Sounds
GWWc Whirlwind Families (i.e.; the tendency of whirlwinds to move in groups)
GWWd Phenomena of Aircraft Trailing Vortices

M ARCHEOLOGY

MA ANTHROPOLOGY
MG GRAPHIC ARTIFACTS AND WRITING
MM NONGRAPHIC ARTIFACTS
MS STRUCTURES AND INFRASTRUCTURE

PRIMARY SCIENCE SOURCES EXAMINED IN ARCHEOLOGY

American Anthropologist (104 vols.)
American Antiquarian (35 vols.)
American Antiquarian Society, Proceedings (37 vols.)
American Antiquity (67 vols.)
American Journal of Archaeology (31 vols.)
Anthropological Institute, Journal (95 vols.)
Anthropological Journal of Canada (13 vols.)
Antiquity (75 vols.)
Archaeological Journal (130 vols.)
Archaeologia (105 vols.)
Archaeology (54 vols.)
Art and Archaeology (35 vols.)
Current Anthropology (43 vols.)
Journal of Archaeological Science (24 vols.)
Journal of Field Archaeology (26 vols.)
Kadath (95 numbers)
Plains Anthropologist (29 vols.)
Man (58 vols.)
New England Antiquities Research Association, Journal (35 vols.)
Polynesian Society, Journal (77 vols.)
Southwest Journal of Anthropology (42 vols.)
World Archaeology (23 vols.)

MA ANTHROPOLOGY[22]

MAA	HUMAN PHYSICAL APPEARANCE
MAB	BIOHEMICAL EVIDENCE FOR DIFFUSION
MAC	CULTURAL PHENOMENA OF ANCIENT PEOPLES
MAD	ART AND MUSIC
MAE	ANOMALOUS HOMINID FOSSILS
MAF	ANCIENT FARMING PRACTICES
MAG	DIFFUSION OF GAMES AND RECREATIONAL DEVICES
MAH	DYNAMICS AND INTERRELATIONSHIPS OF ANCIENT CULTURES
MAI	ANCIENT TRANSOCEANIC COMMERCE AND VOYAGING
MAL	LANGUAGE ANOMALIES
MAM	POSSIBLY SUBSTANTIVE MYTH, LEGEND, AND TRADITION
MAP	PRECOLUMBIAN DIFFUSION OF PLANTS, ANIMALS, DISEASES
MAR	RELIGIOUS AFFINITIES SUGGESTING ANOMALOUS DIFFUSION OF PEOPLES
MAS	ANCIENT SCIENCE AND TECHNOLOGY [MMT]

This section's menu (displayed above) is so specific and detailed that little introduction is required. The obvious foci of the section are:

- Evidence for the anomalous diffusion of hominids, including modern humans, in time and geographical space;
- The sudden appearances of what we presently call "culture";
- The anomalously sudden appearances and disappearances of many ancient cultures;
- The existence of many poorly understood cultures, such as the Ainu and Basques.

MAA HUMAN PHYSICAL APPEARANCE

MAAa Ancient Geographical Dispersal of the Human Races

a.1 White-Complexioned Peoples (e.g.; virtually world-wide but notably: the San Blas Indians, Panama; early Incas, early Easter Islanders and Polynesians, African Cassequers, some Zuni Indians, the Ainus, some Eskimos, some Mandans, the Redin in the Maldives) [MAAb]

a.2 Peoples with Asian Affinities (e.g.; many Native Americans, the Maya, the Olmecs, a few Europeans from Eskimo contacts and intermarriage)

a.3 Races with Reddish Complexions (e.g.; Madagascar, North Africa, southern Europe, China)

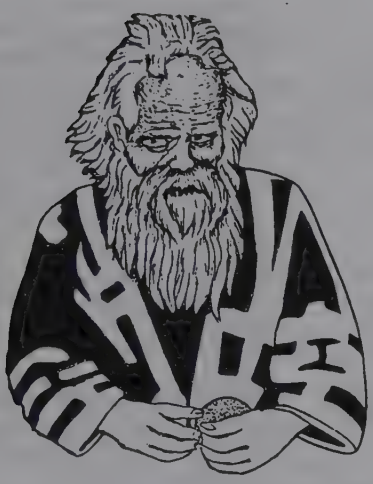
a.4 Pigmies, Dwarfs (e.g.; virtually worldwide but notably: Gold Coast Asamenukapi; Mexican Cocoyomes; Polynesian "little people," such as Hawaii's Menehune; a Paraguay tribe; early Japan; and North America)

MAAb Peoples and Cultures of Unknown or Controverted Origin

b.1 The Ainu (Japan, possibly Caucasoid.)

b.2 The Basques (Spain, anomalous blood, language.) [MAB]

b.3 The Beothuks (Newfoundland, Norse survivors?)
b.4 The Berbers (North Africa, blond, blue-eyed.)
b.5 The Guanches (Canary Islands.)
b.6 The Long Ears (Easter Island, Maldives, also on Incan statues.)



An Ainu man of northern Japan. The Ainu are strikingly different from most Japanese. There are traces of this ancient seafaring race along the northern Pacific Rim. (Science, 284:583, 1999.) [MAAa]

b.7 The Mandans or "Welsh Indians" (Blue eyes, light complexions. Located on the upper Missouri River.)
b.8 The Maori (New Zealand.)
b.9 The Maroiri (pre-Maori New Zealand.)
b.10 The Melongeons (Tennessee.)
b.11 The Olmecs (Mexico.)
b.12 The Polynesians (Oceania, New Zealand)
b.13 The Redin (Maldives.)
b.14 The Samurai (Japan, Ainu link?)
b.15 The Sea Peoples (Mediterranean.)
b.16 The Titans (Old World.)
b.17 The Toltecs (Mexico.)
b.18 The Zuni (American Southwest, Japanese affinities.)
b.19 The Sirionos (Bearded Indians of South America.)
b.20 The Khoisans (Africa, tall with yellowish complexions.)
b.21 The Sadlermiuts (North American, very different from Canadian Eskimos.)

MAAc Possible Existence of Living Neanderthals or Hybrids with Modern Humans (e.g.; the occasional appearance of distinctive Neanderthal traits in modern humans.) [MAEb]

MAB BIOHEMICAL EVIDENCE FOR DIFFUSION

MABa Blood-Type Anomalies [BHC14]
a.1 Blood-Type B Common in East Asia But Rare in Most Native Americans, Including the Hopi, Navaho, and Nearby Tribes (The implication is that eastern Asia is unlikely to be the homeland of most Native Americans.)
a.2 Zuni Indians of American Southwest Have a High Frequency of Blood-Type B. (This links the Zunis to Japan, where Type B has about the same frequency.)
a.3 General Blood-Type Comparisons Suggest Precolumbian European Contacts with New World
a.4 An Anomalous Pocket of Native Americans with Blood Allele "r" (Found in the American Northwest.)
a.5 Blood HTLV-1 (A Retrovirus) This is common in Japan but is also found in Chile, Brazil, Columbia. Precolumbian contacts are suggested.)
a.6 The Basques of Spain Have a Very High Frequency of Rh-negative Blood Compared to Other Europeans. (Basque origin is uncertain.)
a.7 Blood Chemistry of New Zealand's Maoriri Indicates They Occupied the Country before the Maori.

MABb Genetic Anomalies
b.1 mtDNA Data Suggest First New World Entry circa 22,000-

29,000 B.P. (A secondary surge circa 15,000 B.P.; another input. circa 15,000-6,000 B.P., of a distinctive mutation from Polynesia and Melanesia.)

b.2 X-Haplotype of mtDNA Found in Algonkian-Speaking Native Americans. (The X-haplotype is found in Europe but not Asia. Possibly introduced 35,000-13,000 B.P. by Precolumbian European contacts. Also known in ancient Brazilians.)

b.3 C-Haplotype Originated in Asia circa 48,000-24,000 B.P., But Later Appeared in Africa. (Suggests non-African evolution of some hominids.)

b.4 Lemba Tribe of Africa Carries Distinctive Jewish DNA Sequence.

b.5 No Genetic Evidence Suggests that Homo Sapiens Evolved in China. (Contrary to multiregional theory.)

b.6 Polynesian mtDNA found in Madagascar as Well as Indonesia, Southeast Asia, Oceania (i.e.; Polynesians expanded westward as well as eastward)

b.7 mtDNA Studies Suggest Polynesians Swept through Melanesia with Little Interaction or Assimilation

b.8 Ancient Easter Island mtDNA Is Polynesian, Not South American (i.e.; contrary to Heyerdahl's theory)

b.9 mtDNA of Australia's 60,000 B.P. Mungo Man Is "Extinct" (His skeleton, however, is fully modern.) [See next entry.]

b.10 mtDNA of Neanderthals Is Unlike That of Modern Humans (Does this (and b.9) suggest that modern humans evolved with radically different mtDNA complements?)

MABc Anomalous Incidence of Disease

c.1 The "Zuni Disease" (A type of kidney disease which is rare among other Native Americans but common in Japan.) (i.e., another Zuni-Japan link) [MABa.2]

MAC CULTURAL PHENOMENA OF ANCIENT PEOPLES

MACa Existence of Enormous Numbers of Cat and Crocodile Mummies in Egypt (Perhaps not anomalous but very curious to us today)

MACb Unknown Impetus for the European Cultural Explosion circa 40,000 B.P. (e.g.; the revolution in cave art) [BHA2, MADc, MGPo]

MACc Apparent Ritualistic Burial of the Dead by Neaderthals (This is unexpected given the usual brutish image of the Neanderthals.) (e.g.; the flower burial at Shanidar IV cave) [MACd]

MACd Archaic form of Homo sapiens Did Not Bury the Dead [MACc]

MACe Sudden Appearance of Homo sapiens circa 1.9 Million Years Ago (One theory for the change: increased caloric intake due to advent of cooking roots!)

MACf Recent Stasis and/or Degeneracy of Modern Humans

f.1 The Obvious Lack of Biological and Social Innovation in Several Cultures

f.2 Slow Technological Changes in Some Places

f.3 The Rise of Many Diseases and Physiological Afflictions (e.g.; asthma, Lyme disease) [BHE4, BHH35, BHH37]

MACg Recent Peaking and Possible Downturn in IQ Scores

MACh Remarkable Concordance of Zulu and Jewish Customs (e.g.; feast of first fruits, rejection of pork, circumcision)

MACi Appearance in Ancient Mesoamerica of Customs from Oceania and Southeast Asia (e.g.; general calendrics, ritual human sacrifice)

MACj Widespread Precolumbian Taboos Associated with the Five Epogomal Days of the Year (e.g.; Egypt, China, Maya)

MACk Many Cultural Features Shared by Olmecs and China's Shang Dynasty

k.1 General Infrastructure

k.2 Writing [MGWb.9]

k.3 Carved Jade Amulets

k.4 Feline Representations
k.5 Cranial Deformation
k.6 Use of Cylindrical Seals (Although diffusion is suggested here, the Chinese did not share the giant Olmec head sculptures or their use of the zero and place notation)

MAD ART AND MUSIC

MADa Remarkably Early Sculpture (e.g.; Golan Heights)
MADb Precolumbian Diffusion of Musical Instruments
b.1 Nose Flutes (e.g.; Asia and South America)
b.2 Panpipes (e.g.; Peru, Brazil, Solomons)
MADc Unknown Reason for European Cave-Art Explosion circa 40,000 B.P. [BHB14]
MADd Precocious Development of Musical Theory in Mesopotamia circa 5,000 B.P.
MADe Remarkable Acoustical Properties of Stonehenge Stones (This suggests the early use of music in rituals.)

MAE ANOMALOUS HOMINID FOSSILS

MAEa New-World Skeletons with Anomalous Old-World Affinities [For very early hominid fossils see: BHE]
a.1 Caucasoid affinities (e.g.; including: Jomon/Ainu; Kennewick Man, Washington; Alaska's "mummy people")
a.2 Polynesian (e.g.; California)
a.3 Pigmies (e.g.; Tennessee; Central America) [MAAa]
a.4 South Pacific (e.g.; Brazil's "Luzia"; Asian affinities, South American west coast)
a.5 European (Solutrean?) (e.g.; Tennessee)
MAEb Human Skeletons with Neanderthal Features (i.e.; suggesting hybridization)
b.1 From Mounds in Illinois and Nebraska, Greenland's Gandar Man, New Caledonia
b.2 Mixture of Cro-Magnon and Neanderthal features (e.g.; Portugal, 24,500 B.P.)
b.3 Some Modern Europeans Possess a Few Neanderthal Skeletal Characteristics
MAEc Remarkably Large Ossowaries and Necropolises
c.1 Lake Victoria, New South Wales, Australia (10,000 burials)
c.2 Mandan, South Dakota (100 acres of graves)
c.3 Arkansas River (75,000 burials)
c.4 Peru (72,000 skeletons) [MSB3]
MAEd Skeletons with Unusual Features
d.1 "Arched" Foreheads (e.g.; Kansas mound)
d.2 Anomalously High Cephalic Indices (e.g.; Britain)
MAEf Skeletal Evidence of Malnutrition (i.e.; possisbly associated with change from hunter-gatherers to farmers, especially overdependence upon maize)
MAEg South American Affinities (e.g.; New Zealand's Moroiris and other Polynesians)
MAEh Chinese Affinities (e.g.; Australia's first settlers)
MAEi Skeletal Evidence Denying the Extinction of North American Megafauna by Humans
MAEj Eskimo Affinities (e.g.; France) (There exist historical records of old European visits by Eskimos in kayaks.)

MAF ANCIENT FARMING PRACTICES

MAFa Crop Cultivation Preceded Human Settlements (i.e.; contrary to the assumed quick switch from hunter-gatherers to static farming) (e.g.; by 5,000 years in the Middle East)
MAFb Advent of Agriculture Actually Lowered Life Expectancy (i.e.; due to reduced protein, disease in crowded settlements)
MAFc Agriculture in Oceania Began about 28,000 B.P. (This is 20,000 years before Mesopotamia and 10,000 years before Egypt.)

MAFd Hunter-Gatherers Actually Had an Easy, Healthy Life (Including plenty of free time. This view is contrary to today's popular thought.)

MAG DIFFUSION OF GAMES AND RECREATIONAL DEVICES

MAGa Board Games (e.g.; pachisi, backgammon)
MAGb Hook-Swinging (A game known in both Old and New Worlds.)
MAGc Wheeled Toys (e.g.; used in Mexico, China, India)
MAGd Drug Paraphernalia (e.g.; lime pots)

MAH DYNAMICS AND INTER-RELATIONSHIPS OF ANCIENT CULTURES

MAHa The Unexplained (Often Sudden) Demise of Cultures
- a.1 The Mayan Sudden Abandonment of Many Cities circa 800 A.D. (Possible explanations: warfare, drought, environmental degradation, overpopulation.)
- a.2 The Anasazi and Other North American Southwestern Cultures circa 1350 A.D. (Possible Explanations: drought, the dictates of the Kachina religious phenomenon.)
- a.3 The Abandonment of the Indus Valley Cities circa 1900 B.C. (Possible explanations: floods, earthquakes.) (Note: at Mohenjo-daro are signs of sudden, violent deaths.)
- a.4 The Minoans (Crete) circa 1520 B.C. (Thera eruption now widely rejected as inadequate.)
- a.5 The Norse Greenland Settlement (Possible explanations: inability to adapt to colder climate, conflicts with natives.)
- a.6 Tiahuanaco, Bolivia, 900-1000 A.D. (Possible explanations: colder climate rendered agriculture impossible, overpopulation.)
- a.7 Neanderthals circa 35,000 B.P. (Possible explanations: extermination by Cro-Magnons the inability to adapt to the warmer climate.)
- a.8 Akkadian Empire circa 2200 B.C. (Possible explanation: drought.)
- a.9 Polynesian Abandonment of Their "Mystery" Islands circa 1500 A.D. (i.e.; Pitcairn, Norfolk, Necker, etc.) (Possible explanations: inter-tribal warfare, islands too small for viable settlements.)
- a.10 Settlements along Coastal Peru circa 900 B.C. (Possible explanation: too many tsunamis.)
- a.11 Many Cities of the Eastern Mediterranean circa 1200 B.C. (Possible explanations: earthquakes, invasions of the Sea People.)
- a.12 The North American Hopewell Culture
- a.13 The Olmecs circa 300 B.C. (Possible explanation: an apparent cultural imperative, as seen in the self-destruction of cities, burial of statues, etc.)

MAHb Apparent Sudden Origin of Some Ancient Cultures
- b.1 South American Coastal Cities circa 5000 B.P. (Possible Explanation: onset of El Ninos improved fishing.)
- b.2 Tiahuanaco, Bolivia, circa 2000 B.C. (Purported founders: a bearded, white race!) [MAAa]
- b.3 The Olmecs circa 1200 B.C. (Possible explanation: arrival of immigrants from Shang Dynasty or, possibly, from India.)
- b.4 The Polynesians circa 3600 B.P. (Proposed sources: India, Melanesia, Southeast Asia, even South America.)
- b.5 Ancient Egyptians (i.e.; claimed to have arrived suddenly and full-blown. This is ridiculed by mainstream archeologists.)
- b.6 Indus Valley Civilization circa 2500 B.C.

MAHc "Mystery" Cultures
- c.1 The Red-Paint People circa

6000 B.C. (A Neolithic marine culture, possibly circumpolar in extent.) (e.g.: North America, northern Eurasia)
c.2 The Ipiutak Settlements (e.g.; Point Hope, Alaska)
c.3 Pre-Hohokam Culture, North American Southwest, circa 760 B.C.
c.4 The Maroiris, the Pre-Maori People of New Zealand
c.5 The Azilians, Eurasia, circa 200,000 B.P.
c.6 The Ancient Amazonians, circa 11,000 B.P.

MAHd Remarkable Cultural Revolutions (e.g.; Europe and Australia, both about 40,000 B.P.)

MAHe Multiple, Strong, Cultural Affinities That Suggest Precolumbian Diffusion
e.1 Asiatic Aspects of Ecuador's Bahia Culture
e.2 Olmec Culture and That of China's Shang Dynasty and India

MAI ANCIENT TRANSOCEANIC COMMERCE AND VOYAGING

MAIa Possible Precolumbian Diffusion of Technology
a.1 Two-Bar, Backstrap Loom (Asia and America)
a.2 Tie-Dyeing (Asia and America)
a.3 Distinctive Fishhook Design (Oceania, Chile, California)
a.4 Dyestuffs (Asia, Peru, Mesoamerica) (e.g.; madder red, indigo blue, shellfish purple, insect scarlet)
a.5 Bark-Cloth and Bark-Paper Technology (Southeast Asia and Meso- and South America) (e.g.; tapa beaters)

MAIb Remarkable Precolumbian Commerce and Voyaging
b.1 Australian Landfalls 60,000 B.P. and Earlier
b.2 Obsidian Commerce New Britain to New Ireland, 15-20,000 B.P.; and to Borneo (2,400 miles) circa 3,000 B.P.
b.3 Claims of Ancient Trans-Ocean Commerce in Copper [MSE5, MSE6]
b.4 Polynesian Voyages throughout the Polynesian Triangle
b.5 Many Chinese and Japanese American Landfalls (Some were accidental drift voyages; while others were probably intentional. The ocean currents for such voyages are favorable, and they have been occurring for centuries.) [MAMd]
b.6 Balsa-Raft Trading Voyages All along the South American Coast

MAL LANGUAGE ANOMALIES

MALa Old-World/New-World Language Affinities
a.1 Japanese (There are remarkable similarities to Zuni and, to a lesser extent, other Native American languages of the North American west.)
a.2 South Pacific Languages (e.g.; New World, especially South America)
a.3 Hebrew (e.g.; Mixtec)
a.4 Basque (e.g.; Amazon region)
a.5 Norse (e.g.; North American Algonquian, Panama's San Blas "white" Indians) [MALd.2]
a.6 Hittite, Sumerian, Indo-European (e.g.; South America)
a.7 Welsh/Celtic (e.g.; North America, especially the Mandan Indians) [MAAb]
a.8 Egyptian (e.g.; Algonquian, Mayan)
a.9 Semetic (e.g.; Peru and Bolivia, especially Aymara Indians) [MALd.1]
a.10 Chinese (e.g.; North American west coast tribes)

MALb Other Anomalous Language Affinities
b.1 Malagasy (Madagascar) (e.g.; some Borneo languages)
b.2 Armenian (e.g.; Ireland!)
b.3 Celtic (e.g.; Maori)

MALc Mysterious Languages
c.1 Basque (This language is unique, complex. Its origin is still lost in history.)
c.2 Claim of an "Ancient Mother Tongue of the World" (It is said to be sacred and secret

for initiates only. But what initiates?)
c.3 Claim that all modern languages derive from a "mother tongue

MALd Language Oddities
d.1 Bolivia/Peru; Aymara Indian language seems to possess a synthetic character (i.e.; it might be an "artificial" language scientifically formulated.) [MALa.9]
d.2 "White" San Blas Indians of Panama Have a "Compressed" Language (i.e.; it has only a very small number of sounds. Also male and female pronunciations differ.) [MALa.5]

MAM POSSIBLY SUBSTANTIVE MYTH, LEGEND, AND TRADITION

MAMa Claimed Precolumbian Transatlantic Voyages (Other Than Norse)
a.1 Henry Sinclair
a.2 Prince Madoc
a.3 Saint Brendan

MAMb Claimed Precolumbian Transpacific Voyage (Chinese stories of trips to the Land of Fu Sang.)

MAMc Prehistoric Large-Scale Floods (i.e.; possibly large tsunamis from celestial impacts, rupture of the Bosporus and flooding of the Black Sea) [ESM8, ESM12]

MAMd Precolumbian Japanese-Vessel Wrecks and Landfalls in the New World [MAIb.5]

MAMe The Existence of Quetzalcoatl (Supposedly a bearded and white, possibly Norse. There are similar tales of culture-bearers in many places.)

MAP PRECOLUMBIAN DIFFUSION OF PLANTS, ANIMALS, DISEASES

MAPa New-World to Old-World Diffusion
a.1 Sweet potatoes (Known in Andes circa 8,000 B.P., in Polynesia about 1,500 B.P. Possibility 1. South American natives carried plant to Polynesia on their sea-going balsa rafts. Possibility 2. The Polynesians reached South America and obtained the plant themselves. Possibility 3. The plant will flower and seed in the tropics, so that seed could have been carried by ocean drift or birds.)
a.2 Peanuts (South American origin but cultivated in China by 4,000 B.P.)
a.3 Maize (Possibility 1. New World origin, diffusion to Asia and Africa circa 1,000 A.D. Possibility 2. Asian origin, diffusion to New World via Bering Strait.)
a.4 Red-flowering hibiscus (New World origin, hummingbird-polinated, known in China and Persia before 2,000 B.P.)
a.5 Cotton (New-World, small-seed variety diffused to Oceania.) [MAPb.2]
a.6 Pineapples (Brazilian or Caribbean origin, but known in Precolumbian India, Egypt, and the Mediterranean.)
a.7 Yam beans (Mexican origin, known in Precolumbian China.
a.8 Tomatoes (New World origin.)
a.9 Tobacco and cocaine (New World origins, but claimed to have been known in Egypt circa 3,200 B.P. However, traces could have been introduced in 19th. Century insecticides.)
a.10 Squash (A New World plant apparently carried to Southeast Asia.)
a.11 Grain amaramths (Mexico to China.)
a.12 Sunflower (New World to India.)
a.13 Totora-reed (South American origin, but seeds could have been carried by birds.)
a.14 Tapioca/manioc (South America to Polynesia.)
a.15 Chili Peppers
a.16 American soft-shell clam (Known in Precolumbian Europe, but might have been carried back by Vikimgs.)
a.17 Turkeys (New World origin, but claimed to be pictured

on a Precolumbian European tapestry.) [MGPe]
a.18 Syphilis (Supposedly of New-World origin, but found in Precolumbian English burials.)

MAPb Old-World to New-World Diffusion
b.1 Coconuts (Asian origin and good drifters, but a natural presence in Americas unlikely with known ocean currents.)
b.2 Chickens (Asian origin and known early in Europe, but early American types seem to have diffused directly from Asia.)
b.3 Cotton (Old-World type was diploid with large chromosomes, whereas New World native cotton was diploid with small chromosomes. Hybrid was cultivated in New World in Precolumbian times. Cotton seeds, though, can float and be carried by birds.) [MAPa.5]
b.4 Bananas (Asian origins, but arrived early in New World.)
b.5 Bottle gourd (Asian origin, diffused early to New World and Africa. Good floater)
b.5 Hindu Conch/Money Cowrie (Found in Precolumbian North American mounds and in Mexico.)
b.7 Horses (New-World fossils with Precolumbian ages)

MAR RELIGIOUS AFFINITIES SUGGESTING ANOMALOUS DIFFUSION OF PEOPLES

MARa Shinto and Mayan Royal God Cult Affinities
MARb Similarities of Aztec and Christian "Commandments"
MARc Global Commonality of Blood Sacrifices (Generally in response to environmental catastrophes and pressures.)
MARd Buddhist, Shinto, and Taoist Elements in Zuni religion
MARe Commonality of Sacred Roads and Spirit Paths
e.1 Anasazi Roads [MSR2]
e.2 British Processional Ways [MSR1]
e.3 South American Ceques
e.4 Worldwide Mazes and Labyrinths [MSH5]
e.5 Stone Meanders of American Southwest [MSG6]

MAS ANCIENT SCIENCE AND TECHNOLOGY [MMT]

MASa Remarkable Knowledge of Astronomy
a.1 Olmec/Maya/Aztec Calendrics
a.2 Mayan Venus Tables
a.3 Maori Apparent Knowledge of Saturn's Rings and Jupiter's Galilean Satellites
a.4 African Dogon's Claimed Knowledge of Sirius C, etc.
a.5 Claimed Mayan Eclipse-Warning Table
a.6 Unexpectedly High Precision of Ancient Astronomical Observations

MASb Remarkable Medical Capabilities [MMTc]
b.1 Ovariectomy (e.g.; Egypt, Australia)
b.2 Trepanning [MMB7]
b.3 Use of anesthetics (e.g.; from coca and other plants)

MASc Navigational Skills (e.g.; Polynesians, Norse) [MMTh]

MASd Mathematics (e.g.; Mesoamerican use of zero and place notation) [MMTj]

MG GRAPHIC ARTIFACTS AND WRITING[22]

MGC COINS IN UNEXPECTED PLACES
MGG GEOFORMS, GROUND FIGURES
MGK REMARKABLE CALENDARS AND ZODIACS
MGM MAPS
MGP PAINTINGS, SCULPTURES, ICONOGRAPHY
MGQ QUIPUS, STRING FIGURES, MNEMONIC DEVICES
MGW WRITING

Graphic artifacts comprise drawings, paintings, sculpture, coins, quipus, geoforms, icons, and other media meant to communicate information, beauty, reverence for a deity, and sundry other signals. Artifacts in this class become anomalous if they are discovered in the wrong place at the wrong time (thereby implying unaccepted human diffusion), or if they depict precocious geographical or technical knowledge, or if they are still undeciphered by today's professionals. It has also been claimed that some graphic artifacts reveal the presence (past and/or present) of exotic beings and their technology.

MGC COINS IN UNEXPECTED PLACES

MGCa Coins Suggestive of Precolumbian Contacts with the New World (These are suggestive only. Anyone can drop an old coin anywhere.) (e.g.; Norse coin found in Maine)

MGCb Coins Suggestive of Ancient Egyptian Voyages to Australia (e.g.; Egyptian coins found in Queensland)

MGCc Claims of Coins Found in Ancient Geological Deposits (e.g.; coins in coal)

MGCd Oxhide Copper Currency in New and Old Worlds [MGPac, MGPad, MMMa]

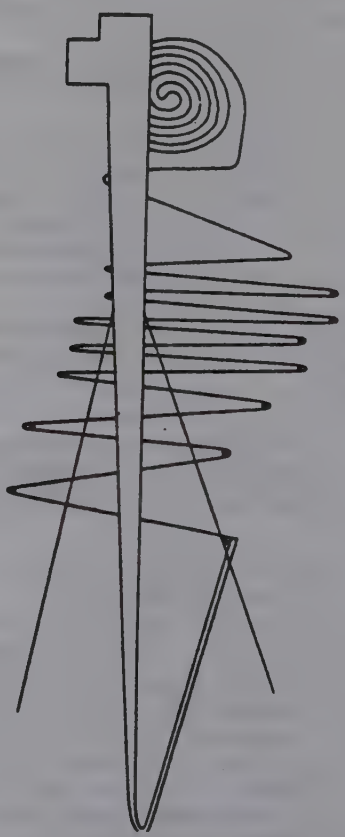
MGG GEOFORMS, GROUND FIGURES

MGGa Unknown Purpose(s) of the Nazca Lines

MGGb Unknown Purpose(s) of the South American Ceques (i.e.; long, converging lines)

MGGc South American Geoglyphs (e.g.; the Pisco Candelabra, which can be seen far at sea)

MGGd Purpose of North America'a Effigy Mounds (e.g.; Ohio's



One of the more puzzling of the huge Nazca figures, as seen from an aircraft. (Archaeology, 39:33, August 1986.) [MGGa]

Serpent Mound)

MGGe North American Boulder and Gravel Effigies

MGGf North American Ground Figures (e.g.; human figure, Blythe, California)

MGGg British Hill Figures (e.g.; Cerne Giant)

MGGh Australian Ground and Tree Drawings

MGGi Engigmatic Ground Markings and Disturbances (e.g.; Australian ground circles ---not crop circles)

MGK REMARKABLE CALENDARS AND ZODIACS

MGKa Zodiacs: A Worldwide Survey (i.e.; noting diffusion of specific "signs")

MGKb Precocious Paleolithic Calendric Notation (e.g.; lunar notation on mammoth bones)

MGKc Calendar Mosaics (e.g.; Olmec mosaic)

MGKd Ancient Metal-Lozenge Calendars (e.g.; Stonehenge lozenge)

MGKe Ancient Calendars Carved in Stone and Wood (e.g.; some Mayan steles)

MGKf Quipus Used as Calendars [MGQa]

MGM MAPS

MGMa Claimed Precolumbian Maps of the New World (e.g.; the Vineland map, Chinese maps of Fu-Sang; the Harris Map)

MGMb Claimed Precocious Maps of Antarctica (e.g.; the Piri Re'is map)

MGMc Stick Maps from Polynesia (These were employed for navigation.)

MGMd Maps Showing Islands That No Longer Exist (e.g.; Hy Brasil)

MGP PAINTINGS, SCULPTURES, ICONOGRAPHY

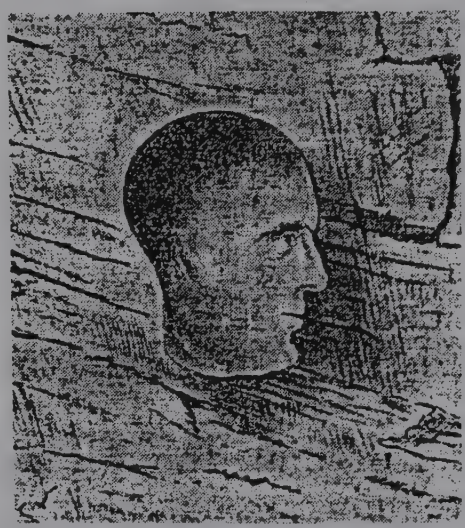
MGPa Depictions of Exotic Humans (These possess features not indigenous to the given place and time.)

a.1 European Features in Precolumbian New World (e.g.; Norse in North America, Romans in Mexico)

a.2 Asian Features in Precolumbian New World (e.g.; Chinese in North America; Hindu in Guatemala) [MSP2.8]

a.3 African Features in Precolumbian New World (e.g.; some of the Olmec giant stone heads, some Mexican statuettes) [MGPa.15]

a.4 Caucasian Features in Australian Bas-Relief



Carving of a human head from a cave in northwestern Australia. Cave is inaccessible without mechanical aid. The profile is obviously not that of an aborigine. (Victoria Institute, Journal of the Transactions, 30:205, 1897.) [MGPa]

a.5 African Features in Early Asian Sculpture

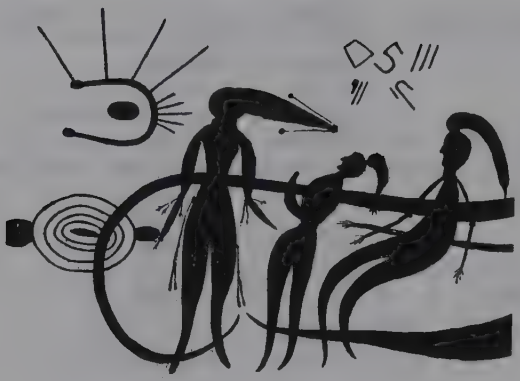
a.6 Easter Island Statue Style in South America and Oceania (e.g.; Ecuador, Hawaii)

a.7 Olmec-Style Head in Canary Islands

a.8 Enigmatic Human Figures in Australian Rock Art (e.g.; Bradshaw paintings)

a.9 Persian Features in Australian Rock Art

a.10 Caucasian Features in



One of the so-called "Bradshaw" paintings in Australia. The symbols and icons have not been interpreted. The human figures and their dress seem to from an unknown Australian race. (Antiquity, 71:801, 1997.) [MGPa]

Chinese Art
a.11 Mexican Montezuma in Greek Statue
a.12 Australopithecine Pebbles in South Africa [MGPp]
a.13 The Stone Figures of Esie, Nigeria
a.14 Egyptian Sculpture in the Caucasus
a.15 Non-African Giant Olmec Stone Heads [MGPa.3]
a.16 Grand Lake Stream spear-head, Maine)

MGPb Scenes Displaying Supposed Advanced Technology
b.1 Palenque "Astronaut" Sarcophagus
b.2 Japanese "Spaceman" Statuettes
b.3 South American Gold Miniature "Airplanes" [??]
b.4 Egyptian Reliefs Depicting "Electrical" Equipment
b.5 Mixtex "Nuclear Reactor"

MGPc Figures with Anomalous Human Features
c.1 Bird-Headed Figures (e.g.; virtually universal)
c.2 Other-Worldly, Ethereal, "Alien" Figures (e.g.; virtually universal)
c.3 Humans with Ape-Like Posteriors (e.g.; France)
c.4 Humans with Halos (e.g.; Columbia, Australian Wandjina figures)
c.5 Buddha Figures (e.g.; early Ireland)

MGPd Mazes (e.g.; widely distributed Minoan-type labyrinths; Maze Stone, California)

MGPe Depictions of Exotic Animals (These are not indigenous to the given place and time.)
e.1 Elephantine Figures (e.g.; widespread in the New World, ancient Egypt)
e.2 Horses (e.g.; Precolumbian South America) [BME10]
e.3 Supposed Dinosaurs (e.g.; North American Precolumbian rock art)
e.4 Five-Toed Llamas (e.g.; South American pottery)
e.5 Simian Sculptures (e.g.; North American Northwest)
e.6 Depiction of the Turkey in Precolumbian Europe [MAPe]
e.7 Depiction of Gorillas in Mayan Art
e.8 Penguins in Paleolithic Art in Mediterranean Region

MGPf Unrecognized Species and Unclassifiable "Monsters"
f.1 The "Piasa" in North America
f.2 Thunderbirds in North America
f.3 Chinese Dragon in New World

MGPg Depictions of Exotic Plants (i.e.; plants not indigenous to place and time) (e.g.; Maize in India) [MAPa]

MGPh Depictions of Astronomical Phenomena
h.1 Star Maps
h.2 Crab Supernova of 1054
h.3 Venus Transits of Sun
h.4 Mallia Table
h.5 Olmec Mosaic Pendant
h.6 Paleolithic European Cave Paintings) [MGK, MGWd.7]

MGPi Deptictions of Anomalous Boats (i.e.; out of time and place)
i.1 Norse Boats in New World (e.g.; Peterborough, Ontario)
i.2 Chinese Craft in Mexico
i.3 Boat Sketches in Oklahoma [MGW Oklahoma "runes"]
i.4 Boat Paintings above Arctic Circle, 6,000 B.P.

MGPj Intricately Carved Paleolithic Stone Spheres (e.g.; Britain)

MGPk Engimatic Large Statues
k.1 Tiahuanaco's Gate of the Sun

(e.g.; undeciphered array of symbols [MSO13]
k.2 Tiahuanaco's Great Idol (e.g.; undeciphered symbols)
k.3 Enigmatic San Agustin Statues, Columbia
k.4 The Sphinx (e.g.; possible great age, original design of head, astronomical purpose, identity of builder)
k.5 Great Stone Sculptures of Quirigua (e.g.; unknown purpose and symbolism)
k.6 Easter Island Statues (e.g.; controverted method of transportation, reasons for construction and mass destruction)

MGPl Sculptures Apparently Products of Precocious Technology
l.1 South American Crystal Skulls and Statuettes (e.g.; precision carving in a most difficult medium)
l.2 Microengraved Artifacts [MGPq, MMT ancient lenses]
l.3 Egyptian Granite Artifacts (e.g.; hard medium carved with only copper tools)
l.4 Paleolithic Sculpture Depicting Knowledge of Weaving Technology

MGPm Ancient Art Positioned with Reference to Acoustics
m.1 Art Located Where Echos Mimic Subjects (e.g.; hoof beats)
m.2 Cave Art Located at Acoustical Nodes (i.e.; where sounds are loudest)

MGPn Pre-Human Art and Sculpture (e.g.; Neanderthal Sculpture) [MSB4]

MGPo Explosions of Human Artistic Activity [BHA2, MACb, MADc]
o.1 European Cultural Explosion (e.g.; circa 40,000 B.P.)
o.2 Australian Cultural Explosion (e.g.; circa 40,000 B.P., possibly 70,000 B.P. at Jinmium) [MGPaa]

MGPp Art and Sculpture of Anomalous Age and Location
p.1 Precolumbian North American Deeply Buried Sculpture (e.g.; Nampa Image, Idaho; Texas stone heads)
p.2 Mastadon Carved on Miocene Bone (Dardanelles)
p.3 Mesoamerican Deeply Buried Carvings (e.g.; Tequixquiac, Mexico, carving, 30,000 B.P.; Totolizingo, Mexico, miniature sculpture)

MGPq Miniature Sculptures (e.g.; Mesoamerica, the Etruscans)

MGPr Large Accumulations of Art and Sculpture of Dubious Authenticity
r.1 Crespi Gold Artifacts
r.2 Arcambaro Clay Figurines, Mexico (i.e.; the Julsrud collection portraying dinosaurs, monsters, etc.)
r.3 Cabrera's Ica Stones, Peru (i.e.; stones engraved with improbable scenes and subjects)
r.4 Burrow's Cave Artifacts. Ohio (i.e.; large quantity of improbable artifacts from secret location)
r.5 Mertz Plates (So-called Mystic-Symbol plates, Michigan.) [MGPac.17]
r.6 Niven Tablets (i.e.; 2600 pictographic tablets)

MGPs Large-Scale Grooved Rocks (e.g.; Nigeria and Peru)

MGPt Tattooing and Body Marking
t.1 Similarity of Maori and Ancient Egyptian Chin Tattooing
t.2 Circum-Pacific V-Shaped Chest Markings

MGPu Early Cave Art Suggests Lack of Language and/or Autism

MGPv Rock Art Suggesting Precocious Animal Husbandry (e.g.; Saharan Harnessed Ostriches)

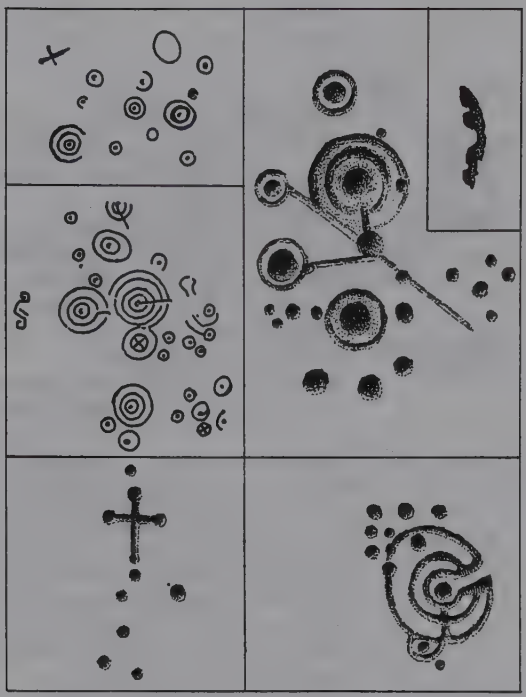
MGPw Rock Art Located in Places Now Very Difficult to Access (i.e.; sheer cliffs inplying large changes in sealevel)

MGPx Kekip Sesonators (i.e.; North American supposed sacrificial tables)

MGPy Ancient African Engraving Suggest Earlier Human Development (i.e.; engravings in ochre, 70,000 B.P.)

MGPz Australian Churingas

MGPaa Enigmatic Paleolithic Motifs and Markings
aa.1 Fingerprint-Style Markings (e.g.; Gav'rinis passage grave, Brittany) [MSU2]
aa.2 Paleolithic Spirals Everywhere
aa.3 Outlined Handprints
aa.4 Red Bands in Caves
aa.5 Cupules, Cup-and-Grooves,

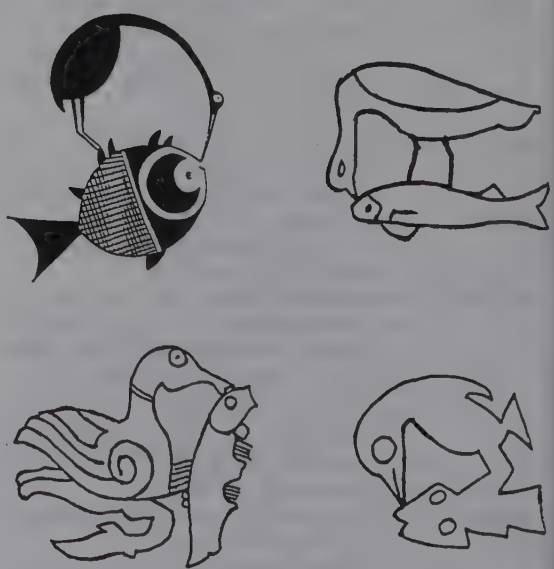


Five examples of cup-and-ring motif from Ireland. (G. Mallery; Picture-Writing of the American Indians, 1972.) [MGPaa]

Cup-and-Rings (e.g.; virtually worldwide; e.g., Jinmium cupules, Australia) [MGPo]
aa.6 So-Called "Ax Grooves" (i.e.; deep vertical grooves in cave walls)

MGPab Widespread Specific Styles of Art and Statuary (These suggest anomalous cultural diffusion.)
ab.1 Chinese (e.g.; Australia, New World, especially Central American Olmec)
ab.2 Egyptian (e.g.; Australia, Oceania, Mesoamerica, South Africa)
ab.3 Japanese (e.g.; New World)
ab.4 African (e.g.; New World, Asia, Europe)
ab.5 Semetic (e.g.; North America)
ab.6 Easter Island (e.g.; Hawaii, Mesoamerica, Afghanistan)
ab.7 Magdelenian (e.g.; the Amazon region)
ab.8 Templar/Masonic (e.g.; Peru) [MGPac]
ab.9 Precolumbus European (e.g.; North America)
ab.10 Celtic (e.g.; Brazil)
ab.11 Roman Brickmaker Marks (e.g.; Mexico) [MGWb, MSP2]
ab.12 Chinese Pottery Marks (e.g.; Europe)
ab.13 Australian in New World (e.g.; Patagonia)

MGPac Widespread Motifs (i.e.; suggestive of diffusion)
ac.1 Lotus
ac.2 Cross
ac.3 Tanit (e.g.; Olmecs)
ac.4 Chinese Rabbit-in-Moon (e.g.; Mesoamerica)
ac.5 Anubis (e.g.; North America)
ac.6 Serpent (e.g.; virtually worldwide)
ac.7 Plumed Serpent (e.g.; Mesoamerica, South America)
ac.8 Buddha
ac.9 Buddah "Soul Net"
ac.10 Bird-and-Fish
ac.11 Chrysanthemum
ac.12 Tree-of-Life
ac.13 Swastika (e.g.; virtually worldwide)



Bird-and-fish motifs. Clockwise from upper left: Mimbres culture, New Mexico; ancient Egyptian hieroglyph; Chimu culture, Peru; ancient China. (Pre-Columbiana, 1:187, 1999.) [MGPac]

ac.14 Caduceus
ac.15 Pecked Cross (e.g.; Mesoamerica)
ac.16 Oxhide Symbol [MGCd, MGPad, MMMa]
ac.17 "Mystic Symbol" Claims (e.g.; Michigan) [MGPr.5]
ac.18 Templar/Masonic [MGPab]
ac.19 Mudglyphs in Caves (e.g.; Tennessee)
ac.20 Enigmatic Patterned Stone Disks, Tablets, Copper Sheets from North American mounds (e.g.; Wilmington Tablet, Louisiana Tablet, Adena Tablet, Cincinnati Tablet)
ac.21 So-Called "Formings" in Art of Ancient Zimbabwe
ac.22 Egyptian Cartouches (e.g.; Idaho, 1900)

MGPad Widespread Specific Cultural Art Objects (i.e.; suggestive of diffusion)
ad.1 Azilian Painted Pebbles (These could be precursors of writing.) (e.g.; Europe)
ad.2 Clay Tokens (i.e.; money and possible precursors of writing) (e.g.; Middle East)
ad.3 Egyptian Scarabs and Statuettes (e.g.; Australia)
ad.4 Japanese Dry-Lacquer Pottery (e.g.; Mexico)
ad.5 Chinese Seals (e.g.; Britain)
ad.6 Engraved Lead Crosses (e.g.; Arizona) (These may be fraudulent.)
ad.7 Ornate Silver Crosses (e.g.; Georgia)
ad.8 Carved and Engraved Pebbles
ad.9 Oxhide Money Tokens [MMMa, MGCd, MGPac]
ad.10 Chinese Lamps
ad.11 Stone-Disc Money Tokens
ad.12 Mexican Carved Camelid Bone (i.e.; Paleoindian Art)
ad.13 Easter Island Stone-Statue Style (e.g.; Celebes)
ad.14 New World Precolumbian Sellos (e.g.; trans-Pacific diffusion)
ad.15 Mysterious Paleolithic Exploding Figurines (e.g.; Europe)
ad.16 Ornate Paleolithic Ivory Carvings (i.e.; possibly counting devices) (e.g.; Europe)

MGQ QUIPUS, STRING FIGURES, MNEMONIC DEVICES

MGQa Quipus (These were used by the Inca but apparently originated in Oceania.) [MGKf]
MGQb String Figures
MGQc Notched Sticks (e.g.; European MAS = Automatic Memory Systems)
MGQd Mnemonic-Song Symbols

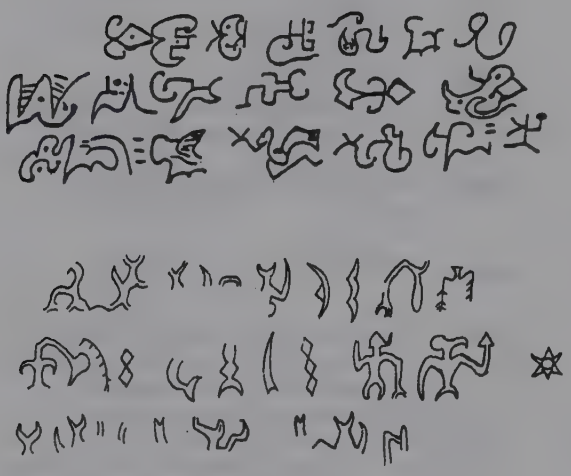
MGW WRITING

MGWa Undeciphered Inscriptions (According to the general scholarly consensus.)
a.1 Easter Island "talking boards" [MGWc]
a.2 Glozel Tablets (These European tablets may be fakes.)
a.3 Phaistos Disk (Minoan, proto-Slavic overtones) [MGWb Aztec similarities]
a.4 Indus Valley Writing (Mohenjo Daro) (Puzzling affinities on Easter Island, the Maldives, and in Brazil.) [MGWc.4]

Sketch of a stamp seal from the ancient city of Mohenjo Daro, Pakistan. This writing has never been deciphered. (Expedition, 9:34, Summer 1967.) [MGWa]

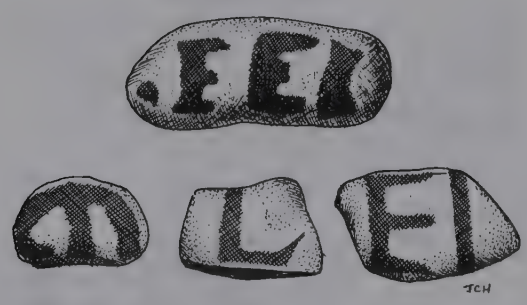
a.5 Olmec Cylinder Seals and Hieroglyphics, Mesoamerica) (The Olmecs were supposedly without a written language.)
a.6 Inca Textile Inscriptions
a.7 Voynich Manuscript
a.8 Yap Script, Micronesia [MGWc]

a.9 Dighton Rock, Massachusetts
a.10 Cuna Writing (Panama) [MGWc]



(Top) A sample of Cuna "writing" from South America. (Bottom) "Writing" on an Easter Island "talking board." (Epigraphic Society, Occasional Papers, 20: 232, 1991.) [MGWa]

a.11 Hawley Stone, Pennsylvania
a.12 Molly Fisher Rock, Connecticut
a.13 Script-Like Petroglyphs, Southeastern Colorado
a.14 Tartaria Tablets, Romania
a.15 Mas d'Azil Inscribed Pebbles [MGPad]



Painted pebbles from the cavern of Mas d'Azil, France. Do they represent a primitive form of alphabet? (Man, 4:37, 1904.) [MGWa]

a.16 Inscribed Stone Ax and Knife, New Jersey
a.17 Neolithic Inscriptions in India (i.e.; symbols similar to those on Mas d'Azil Pebbles [MGWa.15]
a.18 Inscribed Tablets from North American Mounds, Iowa and Ohio (i.e.; many examples)
a.19 New Jersey "Alphabetical Stones" (i.e.; symbols on circular, water-worn pebbles)
a.20 Pennsylvania Inscribed Pebbles (i.e.; exposed by farmer's plow, inscribed with Hebrew-like characters)
a.21 Mexican Inscribed Tablets (i.e.; found under ancient volcanic ash, seem Mongoloid)
a.22 Inscribed Columns 6,000 Feet Deep Off Peru [MSO3]
a.23 Karanovo Inscribed Clay Discs, Bulgaria (i.e.; called "proto-writing")
a.24 Halstead Hieroglyphs, Essex, England (i.e.; seem Egyptian)
a.25 Monte Alban Hieroglyphs, Mexico (i.e.; neither Mixtec nor Zapotec)
a.26 Big Bend Tablet, Texas (i.e.; apparent heiroglyphics)
a.27 Esperanza Stone, Mexico
a.28 Engraved Rocks, New Caledonia (i.e.; mysterious script thereon)
a.29 Michigan Inscribed Stones
a.30 Anau Seal (i.e.; Turkmenistan, possibly proto-Chinese)
a.31 Proto-Cuniform (e.g.; Uruk, Iraq)
a.32 Proto-Egyptian Hieroglyphics, Abydos, Egypt
a.33 Claim of Oldest Alphabet, Egypt
a.34 European Paleolithic Cave Inscriptions (i.e.; termed "proto-writing," roughly 20,000 B.P.)
a.35 Dogon Pictographs, Sudan (i.e.; may be a form of writing)
a.36 Proto-Elamite Script, Iran
a.37 Etruscan Script (i.e.; the characters derived from the Greek, but the language itself is not understood)
a.38 Pre-Maya Isthmian Script, Mexico (e.g.; La Mojarra

inscriptions, sometimes called "epi-Olmec")
a.39 The Meroitic Script, Sudan
a.40 Linear A, the Aegean

MGWb Inscriptions Suggesting Trans-ocean Diffusion (Virtually all examples have been challenged. Opinions vary as to inscription languages)

b.1 Norse Runes (e.g.; Spirit Pond, Massachusetts; Kensington Stone, Minnesota; Bourne Stone, Massachusetts; Narragansett Stone, Rhode Island; Braxton Tablet, West Virginia; Medinia Runestone Argentina; Yarmouth, Nova Scotia; Baffin Bay, Northwest Territories; Oklahoma; Monhegan Island, Massachusetts; Minnesota; Paraguay;
b.2 Ogam (e.g.; claimed in virtually every state and province in North America (e.g.; Anubis Cave, Oklahoma; Crack Cave, Colorado)
b.3 Hebrew (e.g.; Ohio Decalog/Newark Holy Stones; Bat Creek Stone, Tennessee; Las Lunas Inscription Rock, New Mexico; Calalus Tablet, Arizona; Native American possession of Hebrew parchments; Connecticut; Brazil)
b.4 Libyan (e.g.; Healy Stone Texas; Anubis Cave, Oklahoma; the controversial Davenport Tablets, Iowa; Cuenca Tablet, Ecuador; Maine; Tennessee; New Hampshire; Virgin Islands; Andean Chile)
b.5 Minoan (e.g.; Sherbrooke Stones, Quebec; Metcalfe Stone, Georgia; Brazil; Mayan similarities) [MGWa Phaistos Disk]
b.6 Iberic (e.g.; Grave Creek Stone, West Virginia; Braxton Tablet, West Virginia; Davenport Tablets, Iowa; Bourne Stone, Massachusetts; Knapp Stone, Iowa; Mechanicsburg/Susquehanna stones, Pennsylvania; Grand Traverse Stone, Michigan; Alabama; Ohio; Paraquay)
b.7 Egyptian (e.g.; Davenport Tablets, Iowa; Etowah Mound Tablets, Michigan tablets from mounds; Georgia; New South Wales carvings, Australia; Pitcairn; Hawaii; South American inscription annexing coast; England)
b.8 Greek (e.g.; Colorado stele; Paretin, Brazil;
b.9 Chinese (e.g.; Shang Dynasty characters in North America; on Mexican adzes; Olmec/Mayan similarities; Chinese characters in Dead Sea Scrolls)
b.10 Sumerian (e.g.; Argentina; Bolivia, Peru)
b.11 Maori (e.g.; Santiago, Chile); New Guinea with Egyptian similarities)
b.12 Phonecian (e.g.; Parahyba, Brazil; Amazon region; Gran Valaya, Peru; on Sumatran bamboo tablets)
b.13 Islamic/Arabic (e.g.; Nevada; Colorado; California)
b.14 Roman (Mertz plates, Michigan; Maine; New Hampshire; Vermont; Jamaica; brickmaker marks, Comalcalco, Mexico; controversial Tuscon lead crosses, Arizona) [MSP2]

(Left) Typical masons' signs on Roman bricks. (Right) Masons' signs on bricks at Comacalco, Mexico. (Ancient American, p. 8, September/October 1994.) [MGWb, MGPab]

b.15 Tifinag (i.e.; from North Africa) (e.g.; Peterborough, Ontario; Etowah Mound, Georgia)
b.16 Welsh/Coelbren (e.g.; Brandenburg Stone, Kentucky)
b.17 Hittite (e.g.; Newberry Tablet, Michigan)
b.18 Cypriot (e.g.; Lamboyeque gold plate, Peru)
b.19 Cuneiform (e.g.; Hearn Tablet, Georgia; Native American Chief Joseph possessed a cuneiform tablet

from somewhere; Japan)
b.20 Punic (e.g.; Mammoth Mound, Virginia)
b.21 Byzantine (e.g.; Colorado)
b.22 Gaelic Script (e.g.; Colorado)
b.23 Indus Valley Script (e.g.; Easter Island, Brazil) [MGWa]
b.24 Phaistos Disk symbols (e.g.; Aztec ideogram similarities) [MGWa]
b.25 Japanese (e.g.; from Australian shipwreck)
b.25 Mauri (i.e.; a North African script often confused with Maori) (e.g.; Java)
b.26 Mayan (e.g.; Dutch Antilles)

MGWc Unexpected Indigenous Written Languages
c.1 Micmac (Of controverial origin. Some characters seem similar to Egyptian hieroglyphics. Used by northeastern Native Americans.)
c.2 Cherokee (e.g.; North America)
c.3 Olmec Cylinder Seals (e.g.; Mesoamerica) [MGWa]
c.4 Easter Island Talking Boards [MGWa]
c.5 Cuna Writing (e.g.; Panama) [MGWa]
c.6 Pre-Colonial Alphabet (e.g.; Rayner's Mound, Ohio)
c.7 Mixtec pre-Maya Glyphs (e.g.; Mexico) [MGWa]
c.7 Zapotec pre-Maya glyphs (e.g.; Mexico) [MGWa]

MGWd Inscriptions Providing Astronomical Information [MGK]
d.1 Mayan Codices
d.2 New Guinea Bone Markings
d.3 European Bone and Stone Markings
d.4 Ancient Multiplication Tables (e.g.; Israel)
d.5 Navigator's Cave, New Guinea)
d.6 On the Frieze of the Nunnery, Uxmal, Mexico [MSB2]

MGWe Technical Recovery of Almost-Invisible Inscriptions (e.g.; the always-controversial Shroud of Turin)

MGWf Natural, Script-Like Formations
f.1 Hieroglyphic Mica (e.g.; found in North American mounds)
f.2 Chatata-Wall Markings, Tennessee [MSW5]

MGWg Encoded Messages in Ancient Writings (e.g.; claims of significant word patterns in the Torah---the so-called "Bible Code")

MM NONGRAPHIC ARTIFACTS[22]

MMB BONE ARTIFACTS
MMC CLOTH ARTIFACTS
MME FOSSIL FOOTPRINTS, TOOL MARKS, OTHER GEOLOGICAL ARTIFACTS
MMM METAL ARTIFACTS
MMP POTTERY
MMS STONE ARTIFACTS OF ANOMALOUS AGE
MMT ARTIFACTS INDICATIVE OF SOPHISTICATED TECHNOLOGY
MMV REMARKABLE ANCIENT VEHICLES
MMW WOODEN ARTIFACTS

Nongraphic artifacts are basically utilitarian in nature---usually tools of some sort. They are not manufactured to convey information or signals. Even so, many of thse artifacts required considerable skill and sophisticated knowledge to produce. The working materials for nongraphic artifacts can be almost anything: stone, wood, metal, fired clay, etc.

The age and geographical location of nongraphic artifacts can challenge some of the reigning paradigms relating to the capabilities and geographical dispersion of hominids, as indicated in the following short list:

- Pre-Clovis diffusion of humans to North America;
- Pre-Maori colonists of New Zealand;
- The Norse penetration of Hudson Bay and farther west;
- The precocious development of metallurgy and chemistry;
- The presence of stone tools preceding the hominid lines;
- A hominid presence in Eurasia before the accepted date of their emergence from Africa;
- Enigmatic, even incomprehensible, artifacts made from various materials;
- The precocious practices of medicine, surgery, and dentistry;
- The surprisingly early developmnent of mathematical devices; and
- The very early construction and use of ocean-going vessels.

MMB BONE ARTIFACTS

MMB1 Anomalously Early Bone Tools (e.g.; Zaire bone harpoons, circa 80,000 B.P.)

MMB2 Bone Artifacts of Uncertain Affiliation (e.g.; Ipiuak ivory artifacts)

MMB3 Claim of Pre-Clovis Bone Tools in the New World (e.g.; Old Crow Basin, Canada)

MMB4 Anomalies Implied by the Association of Certain Animal Bones with Ancient Human Presence
- 4.1 Human Entrance to the New World by Sea
- 4.2 Human Presence in New Zealand before the Maoris (i.e.; by the Maroiris)
- 4.3 New World Inhabitants Had Well-Developed Marine Capabilities by 10,000 B.P.
- 4.4 Human Entry to the New World via South America
- 4.5 South American Domesticated Ground Sloths over 10,000 Years Ago
- 4.6 Human Settlement in the New World before 12,000 B.P.
- 4.7 Cattle Husbandry Began in Africa Rather than Europe or Middle East
- 4.8 Horse Domestication in Europe (and Possibly the

New World) before 30,000 Years Ago

MMB5 Artificially Worked Animal Bones of Great Age (i.e.; more than 1 million years ago) (e.g.; perforated shark teeth, Britain)

MMB6 Grooved, Punctured, Pounded Human Bones (e.g. tribes of American Southwest pounded skeletons)

MMB7 Evidence of Successful Ancient Skull Surgery (Trepanation)

MMB8 Scratched and Smashed Bones: The Cannibalism Signature (e.g.; the Anasazi, North America)

MMB9 Exotic Mummies (i.e.; mummies displaying physiological characteristics of ethnic groups alien to region) (e.g.; Caucasoid mummies in China)

MMC CLOTH ARTIFACTS

MMCa Precolumbian Old-World Cloth in the New World (e.g.; Norse yarn in the Canadian Arctic)

MMCb Precolumbian Intentionally-Bred, Naturally Pigmented, New World Cotton

MMCc Apparent Precolumbian Appearance of Old-World Textile-Dyeing Technology in New World (e.g.; in South America)

MMCd Precolumbian Appearance of Chinese Weaving Technology in Mexico

MMCe Fossilized Cloth (e.g.; mat in rock salt and potentially of great age)

MME FOSSIL FOOTPRINTS, TOOL MARKS, OTHER GEOLOGICAL ARTIFACTS

MME1 Megamiddens: Giant Bronze-Age Waste Deposits (e.g.; East Chisenbury, Britain)

MME2 Anomalies Implied by Fossil Food
2.1 Humans Not Responsible for Australian Megafauna Overkill
2.2 Australian Grain Processing and Cooking 20,000 Years Ahead of Rest of World

MME3 Unexplained Artificial Ground Disturbances (i.e.; aerial photos of anomalous soil markings in Britain)

MME4 Anomalies Implied by Apparent Metal Tool Marks on Coalified or Petrified Wood
4.1 Humans with Metal Tools Preceded European Settlers in North America and New Zealand
4.2 Humans Used Metal Tools to Cut Wood about 1 Million Years Ago in Britain

MME5 Anomalies Implied by Fossilized Human-Like Footprints in Ancient Rocks
5.1 The Hominid Lineage Began Much Earlier Than Supposed (i.e.; if the age of the rock is greater than 7 million years ---the currently established beginning of hominid lineage)
5.2 Humans Reached the New World before the Clovis Limit of 12,000 B.P. (i.e.; if the age of the rock exceeds this limit, which is usually the case)

MME6 Anomalously Old Human Handprints (i.e.; more than 12,000 years in New World) (e.g.; Orogrande Cave, New Mexico)

MME7 Anomalies Implied by Hominid-Built Hearths and Fire Areas
7.1 Use of Fire before 5 Million Years Ago (i.e.; before the beginning of the hominid line)
7.2 Use of Fire before 2 Million Years Ago outside of Africa (i.e.; before hominid emergence from Africa)
7.3 Use of Fire before 12,000 B.P. in New World (i.e.; before the Clovis Limit)
7.4 Use of Fire before 40,000 B.P. in Australia (i.e.; before supposed human settlement of continent)

MMM METAL ARTIFACTS

MMMa Metal Artifacts with Anomalous Cultural Affiliations
a.1 Norse Weapons and Tools in North America (e.g.; Minnesota)

a.2 Iron Objects in Precolumbian North American Mounds
a.3 Large Copper Hoards In North America and Elsewhere
a.4 Brass Objects in North American Mounds
a.5 Egyptian Copper Artifacts in Australia
a.6 Asian Metal Pins in South America
a.7 Old-World Copper Oxhydes in North America (Oxhydes are copper ingots shaped like ox hides!)
a.8 Roman Bronze Fibula in Brazil
a.9 Iron Objects in the Great Pyramid
a.10 Metal Weapons on an Ephemeral Island (i.e.; the famous but hard-to-credit Jesmond claim)

MMMb Remarkable Metal Artifacts in Precolumbian North America (Precocious technology or Old World visitors?)
b.1 Copper Armor in North American Mound
b.2 Lead Crosses in American Southwest (These are claimed to be of Roman origin but may be fraudulent.) [MGWb.14]

MMMc Metal Artifacts in Ancient Geological Formations (e.g.; many shaky claims of nails, thimbles, chains, etc.)

MMMd Metal Artifacts in Apparently Recent Geological Formations (e.g.; the "Ordovician" hammer, Coso geode) (Such objects could have been heavily mineralized recently, as happens in petrifying springs.) [ESC7]

MMMe Enigmatic Metal Artifacts (e.g.; Dr. Gurlt's famous cube, South African spheres with strange circumferential grooves)

MMP POTTERY

MMPa Pottery with Anomalous Affiliations
a.1 Japanese-Type Pottery (e.g.; Precolumbian New World, especially Ecuador)
a.2 Chinese-Style Pottery (e.g.; Australia, Precolumbian New World)
a.3 Roman-Style Pottery (e.g.; Maine, Brazil, Bolivia)
a.4 Egyptian-Style Pottery (e.g.; Australia)

MMPb Engimatic Ceramic Objects (e.g.; loess balls, Poverty-Point Objects)

MMPc Anomalously Early Pottery (e.g.; Japan, 12,700 B.P.)

MMS STONE ARTIFACTS OF ANOMALOUS AGE

MMS1 Anomalies Implied by Ancient Stone Tools
1.1 Stone Tools Older Than 7 Million Years Anywhere (i.e.; before the origin of the hominid line)
1.2 New-World Stone Artifacts Older Than 12,000 Years (i.e.; before the Clovis-Limit) (e.g.; abundant examples exist)

An ancient stone mortar, one of many found at considerable depths in the auriferous gravels of California. These gravels are of Tertiary age (over 1.6 million years old!). How did the artifacts get mixed in with such old deposits? (D.S. Allen and J.B. Delair; Cataclysm! 1997.) [MMS1]

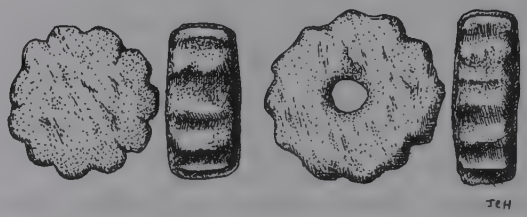
1.3 Eurasian Stone Tools Older Than 1.5 Million Years (i.e.; older than the accepted date for the emergence of hominids from Africa) (e.g.; Siberia, Myanmar)
1.4 Sophisticated Stone Artifacts Older Than 40,000 Years Anywhere (i.e.; before the appearance of modern man and "high" culture in Europe) (e.g.; Africa)
1.5 Crude Stone Artifacts Older Than 2 Million Years Anywhere (i.e.; suggests toolmaking by hominids preceding H. erectus)
1.6 Stone Artifacts Older Than 40,000 Years in Australia (i.e.; the oldest recognized hominid appearance in Australia) (e.g.; Jinmium, Northern Australia)

MMS2 Remarkable Accumulations of Stone Artifacts (e.g.; an immense "lithic factory" in Belize, date unknown)

MMS3 Stone Artifacts in Anomalous Locations
3.1 Chinese Anchor Stones off California Coast (i.e.; implies Precolumbian contacts)
3.2 Stone Tools Found in Deep Offshore Waters (e.g.; stone knife off British Columbia, implying very low sea level and/or ancient coastal commerce) (Of course, one stone knife is hardly convincing. It could have been dropped from a fishing boat.)
3.3 Solutrean Characteristics of North American Stone Artifacts (i.e.; suggests European contacts several millennia ago)
3.4 Precolumbian New World Jade Artifacts from Unknown Sources (Recent discovery of Mayan jade mines in Guatemala may have solved this long-standing puzzle.)
3.5 Ancient British Jade Artifacts from Unknown Sources
3.6 Early Appearance of Stone Tools in Oceania (i.e.; suggests very early marine commerce. circa 6,000 B.P.)
3.7 Precolumbian Polynesian Tools in New World (e.g.; tapa mallets in Mexico)
3.8 Ancient Appearance of Australian-Style Stone Tools in South America (e.g.; Brazil, Patagonia)

MMS4 Stone Microliths or Microtools (i.e.; tools measured in fractions of an inch) (A virtually worldwide phenomenon. But the practical uses of microliths, if any, can only be guessed at. Ritual use or artistic expression may have been involved.)

MMS5 Enigmatic Stone Artifacts (i.e.; purposes unknown or simply very curious) The major categories are:
5.1 Stone Spheres
5.2 Stone Disks ("Discoidal Stones")
5.3 Cogged Stones (i.e.; discs with notched rims)



Cogged stones from southern California. Purpose debatable. (American Antiquity, 26:361, 1961.) [MMS5]

5.4 Stone Yokes or Collars (Actually, the "yokes" were worn about the waist.)
5.5 "Eccentric" Flints (These are of complex and fantastic shapes and of no practical use whatever.)

Typical Oklahoma "eccentric flints." Some made by the Maya are much more ornate and impractical. (American Antiquity, 5:27, 1939.) [MMS5]

MMT ARTIFACTS INDICATIVE OF SOPHISTICATED TECHNOLOGY

MMTa Early Chemistry
- a.1 Paint Production (e.g.; "Mayan blue")
- a.2 Wine-Making
- a.3 "Stone" Manufacturing (e.g.: (e.g.; Mesopotamia)
- a.4 Paleolithic Glue
- a.5 Cement (e.g.; Egyptian "mystery" cement)
- a.6 Glass-Making (e.g.; Galilee, Mexico)
- a.7 Rubber Processing (e.g.; Mesoamerica)
- a.8 Cosmetics Manufacture (e.g.; Egypt)
- a.9 Chemical Etching (e.g.; Hohokam Indians)
- a.10 Purported Stone-Softening (e.g.; Peru)

MMTb Early Metallurgy
- b.1 Appearance and Use of Difficult-to-Purify Metals (e.g.; platinum in South America; aluminum in China.)
- b.2 Soldering and Welding (e.g.; South America)
- b.3 Plating and Gilding (e.g.; gold and silver in the New World)

MMTc Early Medicine and Dentistry
- c.1 Surgical Instruments (e.g.; for abortions, especially)
- c.2 Successful Major Surgical Operations (e.g.; amputations, trepanning) [MMB7]
- c.3 Protheses (e.g.; artificial limbs, toes, noses)
- c.4 Dentistry (e.g.; filled cavities, false teeth)

MMTd Advanced Tools
- d.1 Microengraving Equipment (This probably included magnifiers and miniature tools.)
- d.2 Drilling of Hard Gems and Stone (e.g.; holes in gems, the drilled-out, granite sarcophagus in the King's Chamber in the Great Pyramid)
- d.3 Results of Stone Machining (e.g.; remarkable Egyptian artifacts in hard granite, such as narrow-necked, hollow vessels)

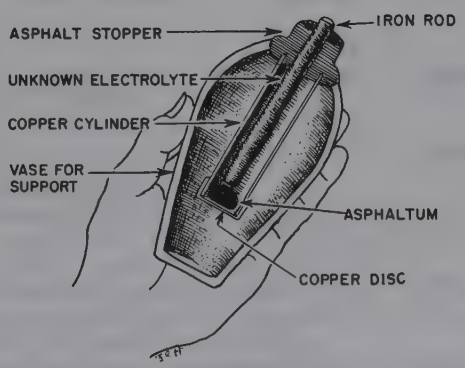
MMTe Ancient Musical Instruments
- e.1 Wind Instruments (flutes, Pan pipes, etc.)
- e.2 Percussion Instruments (e.g.; gongs, drums, xylophones)

MMTf Advanced Toys (e.g.: wheeled toys in New World)

MMTg Long-Distance Communication (e.g.; purported "telephone: in early India) (This need not have been electrical in nature.)

MMTh Scientific Instruments
- h.1 Navigation Devices (e.g.; (Olmec compass)
- h.2 Optical Instruments (e.g.; lenses, mirrors)
- h.3 Sun Dials
- h.4 Crude Seismometers
- h.5 Astronomical Sighting Devices (e.g.; stone collimators) [MSB Zenith tubes]
- h.6 Balances and Standard Weights

MMTi Purported Electrical Devices
- i.1 Objects That "Look" Electrical (e.g.; some ancient Egyptian "lights" and "insulators.")
- i.2 Apparent Electroplated Objects [MMTb]
- i.3 Potential Crude Battery (i.e.; the renowned Baghdad battery)

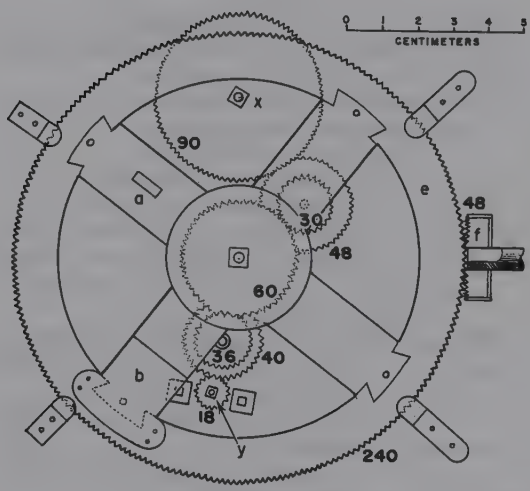


Cross section of the famous Baghdad battery. It has an iron electrode insulated with asphalt and a copper cylinder filled with an unknown electrolyte. (Science Digest, 41:17, April 1957.) [MMTi]

MMTj Mathematical Devices (e.g.; Greek "computer,: the Mallia Table, which was a counting device of some sort)

MMTk Advanced Weapons (e.g.; radioactivity and supposed nuclear weapons at Mohenjo-Daro)

MMTl Engimatic Machines (e.g.; the speculative "manna machine")



Main mechanism of the Greek "computer." Numbers indicate the numbers of teeth in the gears. (Natural History, 71:8, March 1962.) [MMTj]

MMV REMARKABLE ANCIENT VEHICLES

MMVa Ancient Wooden Ships of Great Size (e.g.; Precolumbian native ships in the Caribbean and the giant vessels of old China)

MMVb Remarkable Ancient Reed Vessels (e.g.; Indus Valley, 4,300 B.P.)

MMVc Ocean-Going Skin Boats (e.g.; currachs and kayaks, both which were apparently able to transit the North Atlantic)

MMVd Very Large Precolumbian, South American, Ocean-Going Rafts (e.g.; Inca balsa rafts used in coastal commerce)

MMVe Mysterious Shipwrecks in Reported in Unexpected Places
- e.1 Egyptian Desert
- e.2 Morocco
- e.3 Colorado delta
- e.4 Brazil (e.g.; possibly Roman)
- e.5 American Northwest (e.g.; Chinese, Japanese)
- e.6 Texas (e.g.; purported Roman)
- 6.7 Britain (e.g.; purported Egyptian)

MMVf Claimed Flying Machines
- f.1 The Fabled Vimanas (i.e.; flying craft of ancient India)
- f.2 Gliders (e.g.; man-carrying, Peru; Egyptian model 'plane')
- f.3 Balloons (e.g.; possibly in ancient Peru)

MMW WOODEN ARTIFACTS

MMWa Norse Wooden Artifacts in North America

MMWb Advanced Weaponry (e.g.; wooden spears 400,000 B.P.)

MMWc Remarkable Ancient Tools (e.g.; wooden saw with quartz teeth)

MMWd Engimatic Wooden Objects (e.g.; cedar collars) [MMS5.5]

MS STRUCTURES AND INFRASTRUCTURE[19,20]

MSA	ANCIENT ASTRONOMICAL OBSERVATORIES
MSB	MISCELLANEOUS STRUCTURES
MSC	WATER-CONTROL STRUCTURES
MSD	DOLMENS, MENHIRS, ROCKING STONES
MSE	EXCAVATED STRUCTURES
MSF	FORTS
MSH	STONE ROWS, CIRCLES, AND OTHER SIMPLE STONE CONFIGURATIONS
MSI	ANCIENT FURNACES, SMELTERS, HEARTHS
MSM	CAIRNS, SHELL MOUNDS, EARTHEN MOUNDS
MSO	CARVED ROCKS, SPHERES, COLUMNS
MSP	PYRAMIDS, ESPECIALLY THE GREAT PYRAMID
MSR	ANCIENT ROADS AND BRIDGES
MSS	CITIES AND COMPLEXES
MST	ANCIENT TOWERS
MSU	ANOMALOUS STONE TOMBS, CHAMBERS, AND PASSAGE GRAVES
MSW	WALLS, EMBANKMENTS, DITCHES

Ancient civilizations are often rated on the size and sophistication of their buildings and supporting roads, canals, and other infrastructure. It is more than apparent that the ancient engineers were impressive innovators in structural design and, especially, in the quarrying and installation of multiton blocks of stone. While size and sophistication in engineering are sometimes anomalous, a more contentious issue is that of building style: Does New World architecture demonstrate the Precolumbian diffusion of culture across the Atlantic and/or Pacific?

Unrelated to engineering proficiency and transoceanic diffusion is the fact that not a few ancient structures---worldwide---remain enigmatic to archeologists and anthropologists. We still do not comprehend their purposes.

We commence with a few of the many questions posed in the following pages.

- Did the Vikings settle in New England as well as Newfoundland?
- What is the significance of the signs of intense heat at many ancient sites?
- How were multiton (610 tons at Baalbek) stone blocks quarried and installed?
- What was the purpose of the tiny buildings and tunnels in Mesoamerica?
- Why were some Maya buildings and sites constructed asymmetrically?
- How did the Inca stone masons fit huge multisided stones together so snugly?
- Why do Maya pyramids resemble those of Asia so closely?
- Who mined incredible quantities of copper from the Lake Superior area in Precolumbian times?
- Are all of the New England stone chambers of colonial origin?
- How were the large Costa Rican stone spheres crafted with such precision?
- What was the purpose of the "air shafts" in the Queens Chamber in the Great Pyramid?
- Why do European passage graves possess their curious acoustical properties?

MSA ANCIENT ASTRONOMICAL OBSERVATORIES

MSA1 Notable Observatory Buildings: A New World Survey (e.g.; Casa Rinconada, New Mexico)

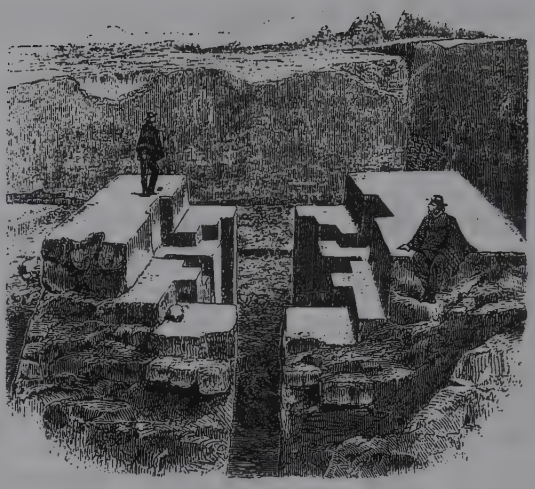
MSA2 The Great Pyramid as a Possible Astronomical Observatory (i.e.; R. Proctor's theory)

MSB MISCELLANEOUS STRUCTURES

MSB1 Miscellaneous Ancient Structures: North America
- 1.1 Purported Viking Buildings (e.g.; Norse "ruins" in Massachusetts) [EST1]
- 1.2 Sophisticated Structures (e.g.; Casa Rinconada, Chaco Canyon, New Mexico)
- 1.3 Very Ancient Structures (e.g.; wooden structure, 12,200 B.P., Ohio)
- 1.4 Buildings Showing Evidence of Intense Heat (e.g.; fire-hardened mud structures, Colorado)
- 1.5 Structures That Required Prodigious Labor and Social Organization (e.g.; Great Houses at Chaco Canyon, New Mexico)
- 1.6 Use of the True Arch in New World (e.g.; strange rock structures in Utah)

MSB2 Miscellaneous Ancient Structures: Mesoamerica
- 2.1 Very Tiny Buildings (e.g.; Mayan site of Tulum, Mexico) (In fact, many other Mayan buildings imply users of diminutive stature.) [BHU3]
- 2.2 Use of the True Arch in New World (e.g.; La Muneca, Mexico)
- 2.3 Possible Use of Stone-Softening Agent (e.g.; Mitla site, Mexico) [MSB4.4]
- 2.4 Hidden Messages in Structure Design (e.g.; Uxmal site, Mexico)
- 2.5 Enigmatic Building Asymmetry (e.g.; the Nunnery, Uxmal, Mexico)
- 2.6 Precision Megalithic Construction (e.g.; Labaantun, Belize)

MSB3 Miscellaneous Ancient Structures: South America



At Grand Chimu, Peru, E.G. Squier found this utterly incomprehensible structure. (E.G. Squier; Peru: Incidents of Travel..., 1877.) [MSB3]

- 3.1 Enigmatic Labyrinthine Building, Pacatmanu, Peru)
- 3.2 Use of the True Arch in New World (e.g.; Pachacamac, Peru)
- 3.3 Incomprehensible Structures (e.g.; Grand Chimu, Peru)
- 3.4 Row of 13 identical buildings with no apparent purpose, near Casma, Peru)
- 3.5 Purported Immense Ossowary (e.g.; Peru) [MAEc]
- 3.6 La Olla: a large Beehive Structure of Unknown Purpose, El Panecillo, Ecuador

MSB4 Puzzles of Inca Stone Masonry
- 4.1 Installation of Interlocking Stone Blocks of Large Size and Many Angles
- 4.2 Mystery of How Multiton Blocks Were Lowered and Lifted during Fitting
- 4.3 Apparent Lack of Standing Room for the Thousands of Workers Needed to Pull Stones Up Steep Ramps
- 4.4 Features Consistent with Use of a Stone-Softening Agent (e.g.; Mitla, Mexico)
- 4.5 Affinities with Ancient Egyptian Methods (e.g.; curious protuberances)

MSB5 Tiahuanaco: The Baalbek of the New World

5.1 Amazing precision craftsmanship with Hard Stone
5.2 Unexplained Disarray of Huge Building Stones at Puma Punku
5.3 Unusual Use of Metal Clamps to Secure Stone Blocks (Also an Egyptian Technique.)
5.4 The Inexplicable and Enigmatic Shapes of Some Stones (These enigmatic stones are at Puma Punku.)
5.5 The Debated Purpose of Puma Punku
5.6 Similarity of "Death Chambers" at Tiahuanaco and Ancient Egypt
5.7 Claims of Submerged Ruins in nearby Titicaca

MSB6 Possible Neanderthal Structures (One is located deep in a French cavern.)

MSB7 Puzzles of the Maltese Temples
7.1 Lack of Structural Antecedents
7.2 Ancient Maltese Infrastructure Incompatible with Size and number of Temples
7.3 Sophisticated Acoustical Engineering in Hypogeum
7.4 Unexplained Fire-Reddened Walls of Some Temples
7.5 The Purpose of the Many Stone Spheres at Some Temples
7.6 Unusual Total Lack of Astronomical Alignments (Most ancient cultures were absorbed in astronomy.)

MSB8 Baalbek: The Tiahuanaco of the Old World
8.1 Unknown Techniques for Quarrying, Lifting, and Transporting the 610-Ton Trilithons
8.2 Mysterious Abandonment of 1,100-Ton Monolith at Quarry
8.3 Why Were Such Large Blocks Needed in the Temple Foundation?

MSB9 Miscellaneous Ancient Structures: Asia
9.1 Precocious Use of Iron Beams in India
9.2 Precision-Fit Stones in Maldive Structures (These resemble some Easter Island and Inca structures.)
9.3 Ancient Wooden Building in Japan (Aomori site, circa 10,000 B.C.)

MSB10 Miscellaneous Ancient Structures: Oceania
10.1 Examples of Inca-Style Masonry (e.g.; Easter Island)
10.2 Presence of Large Stepped Pyramidal Temples (e.g.; Tahiti, 40 feet high)
10.3 Use of Immense Stones (e.g.; 100-150 tons, Tonga)
10.4 Almost Fanatical Proliferation of Marae (even on remote, virtually uninhabitable islands)

MSB11 Miscellaneous Ancient Structures: Africa (Here, we exclude the pyramids covered in MSP.)
11.1 Use of Stones Sometimes Larger Than Those in Great Pyramid (e.g.; Valley Temple, Giza)
11.2 Use of Inca-Style Interlocking, Precision-Fit Stones (e.g.; Egypt)
11.3 Obscure Purpose and Enigmatic Design of the Osireion, Abydos, Egypt

MSBa Musical Buildings (e.g.; 500-year-old Italian baptistry) [MSU3]

MSC WATER-CONTROL STRUCTURES

MSC1 Remarkable Ancient Aqueducts and Water-Delivery Systems (e.g.; Canal of Joseph, Egypt)

MSC2 La Cumbre: Peru's Intervalley Canal (It is about 50 miles long, part canal, part elevated aqueduct.)

MSC3 Subterranean Tunnel-Well Systems (e.g.; the qanats, 160,000 miles of them in Iran)

MSC4 Water-Condensing Structures (e.g.; Greek stone-pyramid condensers, Theodosia)

MSC5 Four Notable Ancient Irrigation Systems
5.1 Michigan Ancient "Garden Beds"
5.2 Hohokan Canal System, Arizona
5.3 "Platform Agriculture" in the High Andes
5.4 Amazon Massive Artifical Canal System (These were also used as a fishery.)

MSC6 Curious Old Dams (e.g.; a Nile

A rare torrential rain washed this away part of an elevated section of Le Cumbre, a 50-mile canal built by the Chimu in Peru. (Journal of Field Archaeology, 12: 77, 1985.) [MSC2]

The 10-foot-high "Hammer of Thor" near Ungava Bay, Quebec. Builders unknown. (Anthropological Journal of Canada, 5: 41, 1967.) [MSD2]

dam built by the ancient Egyptians)

MSC7 Unusual Water-Containment Structures (e.g.; the "Great Bath," Pakistan)

MSC8 Notable Ancient Ship Canals (e.g.; Sesostris Nile-to-Red Sea Canal)

MSC9 Artificial Harbors (e.g.; the Cothon Basin, Pakistan)

MSD DOLMENS, MENHIRS, ROCKING STONES

MSD1 Some Minor Enigmas Concerning Menhirs (e.g.; Why are so many giant menhirs prostrate and broken?

MSD2 Menhirs in Unexpected Places (e.g.; Burnt Hill, Massachusetts)

MSD3 Er Grah as a Foresight in an Eclipse Predictor (Er Grah is a 67-foot menhir in Brittany.)

MSD4 Dolmen-Like Structures Located Outside of Western Europe (e.g.; North Salem, New York)

MSD5 Curious Rocking Stones (e.g.; the Three Breeders, Wharton Crag, England)

MSE EXCAVATED STRUCTURES

MSE1 Lines of Pits (e.g.; 209 pits in rock, Cajamarquuilla, Peru, purpose unknown)

MSE2 Puzzling Pits: A Survey; (e.g.; Amazon's "terras pretas") (These are huge pits of exceptionally fertile black earth of uncertain origin.)

MSE3 Anomalous Ancient Shafts and Tunnels: A Survey

3.1 Length or Depth over 50 Feet in Solid Rock (e.g.; Samos Tunnel, Greece)

3.2 Perplexing Systems of Shafts and Tunnels (e.g.; dene-hole complex, Essex, England)

3.3 Miniature Shafts and Tunnels (e.g.; Monte Alban, Mexico) (These are too small for use by modern humans.)

3.4 Use of Curious Materials to Line Structures (e.g.; Ipswich shafts, England)

3.5 Ancient Precision Drilling of Tunnels from Both Ends (e.g.; Samos tunnel, 5,000 feet long, Greece)

MSE4 The Oak Island Shaft and Tunnels (The famous "Money Pit") (Nova Scotia)

MSE5 Remarkable Ancient Mines and Quarries (e.g.; the immense size of the ancient Lake Superior Copper Mines) [MAIb.3, MSE6]

MSE6 Production-Consumption Discrepancy in Prehistoric Lake Superior Copper Mining (The immense amount of mined copper cannot be accounted for in all of antiquity's copper artifacts.)

MSE7 Sculpted Hills and Mountains (e.g.; sculpted hills of Balbeldoab, Micronesia)

MSE8 Terrestrial Zodiacs and Star Maps (e.g.; Glastonbury Zodiac, England)

MSF FORTS

MSF1 Earthen Hilltop Forts: A Survey and List of Puzzles

1.1 Walls Are Intentially Breached by Many Entrances (e.g.; Britain and North America)

1.2 Embankments Are Low and Easily Scaled (e.g.; Britain and North America)

1.3 "Fort" Perimeters Are Too Long to Be Defended (e.g.; Britain and North America)

1.4 Some "Forts" Are Remote from Population Centers (e.g.; Fort Ancient, Ohio)

MSF2 Notable Ancient Stone Forts: A Survey and List of Puzzles

2.1 Many Are of Doubtful Military Value

2.2 Some South American Forts Use Immense, Precision-Fitted Stones (e.g.: Sacsahuaman, Peru)

2.3 Some North American Forts Show Signs of Vitrification (e.g.; Warren County, Ohio)

MSF3 The Vitrified Forts of Scotland (Debatable method of vitrification.)

Map of Fort Ancient, Ohio, from Squier and Davis. Some question that it was really built for defense. (E.G. Squier and E.H. Davis; Ancient Monuments of the Mississippi Valley, 1847.) [MSF1]

MSH STONE ROWS, CIRCLES, AND OTHER SIMPLE STONE CONFIGURATIONS

MSH1 Short Stone Rows (i.e.; 2-6 stones)(e.g.; Devil's Arrows, Britain)

MSH2 Long Stone Rows (i.e.; 7+ stones (e.g.; Dartmoor stone rows, Britain)

MSH3 Double Stone Rows and Avenues (e.g.; Avebury, Britain)

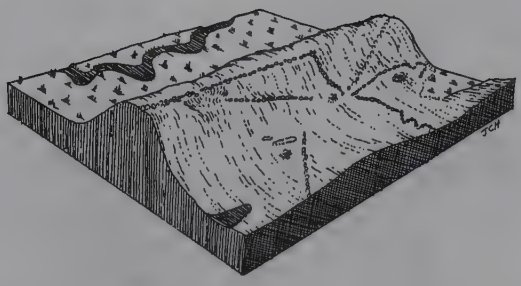
MSH4 Multiple Lines of Stones in Western Europe (e.g.; Carnac, Brittany, France)

MSH5 Stone Arrays and Mazes (e.g.; Tecopa Maze, Arizona)

MSH6 Stone Meanders (e.g.; Panamint Valley, California)

MSH7 Stone Circles: General Characteristics and Purpose(s)

MSH8 Recumbent Stone Circles (There is one prostrate stone in



Curious stone rows draped over an esker near Boxborough, Massachusetts. (J.W. Mavor, Jr., and B.E. Dix; Manitou, 1989.) [MSH2]

each circle, significance unknown.)

MSH9 The Megalithic Yard; A Megalithic Standard of Length?

MSH10 Geometrical Sophistication of Stone Circles (e.g.; use of 3-4-5 triangles in design)

MSH11 Supposed Occult Influences on the Design of Stonehenge

MSH12 Claims of Physical Phenomena Associated with Stone Circles
- 12.1 Luminous Phenomena
- 12.2 Magnetic Phenomena
- 12.3 Anomalous Radioactivity
- 12.4 Acoustical Phenomena
- 12.5 Psychological Effects

MSH13 Claims of Psychical Phenomena Concentrated at Stone Circles (The dowsers claim the circles are foci of "earth energies.")

MSH14 Integration of Stone Circles and the Environment (e.g.; presence of geological faults and springs)

MSH15 Large-Scale Organization of Stone Circles (i.e.; associated with leys and ritual roads)

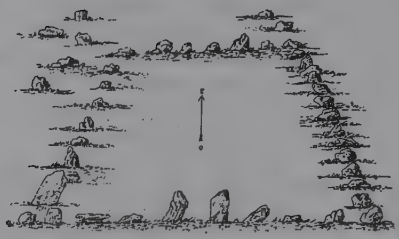
MSH16 Stone Circles Outside Britain and Ireland (e.g.; found virtually everywhere)

MSH17 Stone Circles as Eclipse Predictors

MSH18 Stonehenge's Remarkable Rectangle (Stonehenge is located at a unique latitude where four of its markers are on the corners of a rectangle representing highly significant astronomical alignments.) [MSH20.2]

MSH19 Did the French Build Actually Stonehenge?

MSH20 Geometrical and Geographical Anomalies of Stone Rectangles
- 20.1 Use of 3-4-5 Triangles in their Geometries [MSH10]
- 20.2 Location at Unique Latitude Where Significant Astronomical Alignments Are Possible [MSH18]



A stone rectangle at Lanveoc, Finisterre, Brittany. (A. Burl; From Carnac to Callanish, 1993.) [MSH20]

MSH21 Calendar Sites (e.g.; Calendar-I site, Vermont)

MSH22 Medicine Wheels and a Possible Old World Connection? (e.g.; Big Horn Medicine Wheel, Wyoming; possible medicine wheel in Portugal)

MSH23 Woodhenges (i.e.; roughly circular arrangements of post holes) (e.g.; Stanton Drew, Britain)

MSI ANCIENT FURNACES, SMELTERS, HEARTHS

MSI1 Ohio's Furnace-Like Structures (These represent unexpectedly early iron-smelting in America. They are post-Columbian but pre-European settlement of the area.)

MSI2 Giant Neolithic Cooking Hearths in Britain and Ireland

MSI3 Evidence for Anomalously Early Iron-Smelting in Subsaharan Africa (i.e.; before 600 B.C.)

MSI4 Innovative Iron-Smelting Technology in Subsaharan Africa (i.e.; use of pre-heating, blowpipes, charcoal)

MSM CAIRNS, SHELL MOUNDS, EARTHEN MOUNDS

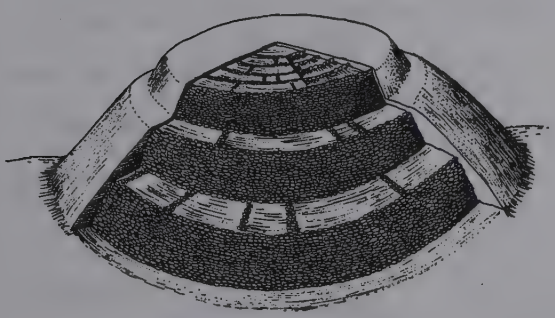
MSM1 Giant Shell Mounds (e.g.; Crystal River, Florida) (Some of the shell mounds are truncated pyramids.)

MSM2 The Shell Keys of Florida (i.e.; artificial islets made of discarded shells) (e.g.; Pine Island Sound, Florida)

MSM3 Curious Cairns and Rock Piles
- 3.1 Extremely Large Cairns (e.g.; Knocknarea, Ireland)
- 3.2 Effigy Cairns (e.g.; Connecticut)
- 3.3 Conical and Pillar Cairns (e.g.; Cornwall, New York)
- 3.4 Burnt-Rock Mounds (e.g.; southwest Texas)
- 3.5 Lime-Coated Boulder Piles (e.g.; Belize)
- 3.6 Solar-Aligned Cairns (e.g.; Falmouth, Massachusetts)
- 3.7 Sugmerged Cairns (e.g.; Rock Lake, Wisconsin)
- 3.8 Cairn Complexes (e.g.; Clava Complex, Scotland)

MSM4 Cairn Lines (e.g.; Pampa de Media, Peru)

MSM5 Puzzling Earthen Mounds: A Survey
- 5.1 Monk's Mound, Ohio (e.g.; unexplored internal stone structures)
- 5.2 La Venta, Mexico (e.g.; buried structure within)
- 5.3 Tiahuanaco, Bolivia (e.g.; stange water basin and conduits)
- 5.4 Silbury Hill, Britain (e.g.; internal structures)



Internally, Silbury Hill, England, is a layered structure reinforced by concentric rings of chalk blocks. (P. Devereux; Symbolic Landscapes, 1992.) [MSM5]

MSM6 Lines and Arrays of Earthen Mounds (e.g.; Death Valley, California)

MSM7 Enigmatic Mound Complexes
- 7.1 Poverty Point, Louisiana (e.g. unknown builders)
- 7.2 Watson Brake, Louisiana (e.g.; great age, 5,000 B.P., and unknown builders)

MSO CARVED ROCKS, SPHERES, COLUMNS

MSO1 Boulders with Triangular Holes (i.e.; widespread in North America, purpose unknown) (Popularly called "Viking mooring stones.")

MSO2 Puzzles of the Large, Precisely-Crafted Stone Spheres, Costa Rica
- 2.1 Identity of Makers
- 2.2 Age of Spheres
- 2.3 Source of Granite
- 2.4 Manufacturing Technique
- 2.5 Method of Transportation
- 2.6 Reason for Burying Some
- 2.7 Purpose of the Spheres

MSO3 Carved Columns in an Ocean Trench (Photographed off Peruvian coast, 6,000 feet deep.) [MGWa.22]

MSO4 Curious Arrays and Groupings of Stone or Wooden Columns (e.g.; monoliths of Tafi, Argentina)

MSO5 The Latte Stones of the Marianas (These are tall limestone pillars capped by hemispherical carved stones. They were probably only house supports.)

MSO6 The Ancient Iron Pillar at Delhi (Erected circa 300-400 A.D., this tall iron column has remained virtually rustless.)

MSO7 The Cement-Like Cylinders of New Caledonia (Origin and purpose unknown.)

MSO8 Unusual Gnomons (e.g.; the inithuatana, Machu Picchu, Peru)

MSO9 Stone Chairs Hewn Out of Solid Rock (e.g.; Manti, Ecuador)

MSO10 Curious Distribution of Large Stone Jars (i.e.; Laos and Sulawesi)

MSO11 Enigmatic Configured Rocks (Huge rocks carved with reliefs of unknown cities,

along with steps, channels, niches, seats) (e.g.; Kenko, Peru)

MSO12 The Haamonga Stones; A Trilithon on Tonga (i.e.; like a Stonehenge trilithon, but made of coral rock)

MSO13 Tiahuanaco's Gateway of the Sun: Incredible Stonework (The symbols carved thereon may carry a message.)

The Haamonga Stones, Tonga. (P. Bellwood; Man's Conquest of the Pacific, 1979.) [MSO12]

MSP PYRAMIDS, ESPECIALLY THE GREAT PYRAMID

MSP1 Anomalies of Stone and Brick Pyramids: A Global Survey
- 1.1 Pyramids in Improbable Locations (e.g.; Tahiti, the Maldives)
- 1.2 Pyramids Producing Unusual Acoustical Effects (e.g.; at Chichen Itza)
- 1.3 Pyramids Producing Light-and-Shadow Effects (e.g.; Chichen Itza, the Great Pyramid)
- 1.4 Pyramid Trans-Ocean Design Similarities (e.g.; Asia and Mesoamerica)
- 1.5 Immense Pyramids Consisting of Hundreds of Millions of Sun-Dried Bricks (e.g.; Peru)
- 1.6 Characteristics of Some Stone Blocks Suggesting that Some Egyptian Pyramids Were "Poured" (e.g.; Giza)
- 1.7 Pyramids Incorporating "Mystical Numbers" in Their Design (e.g.; Giza)
- 1.8 Pyramids That Exhibit the Existence of Sophisticated Cultures before Egypt's First Dynasty
- 1.9 Purpose of Japanese "Mini-Pyramids
- 1.10 Pyramids with Features Seemingly beyond Builders' Engineering Capabilities (e.g.; Khafre's Pyramid)

MSP2 Anomalies of Comalcalco's Brick Pyramid and Associated Structures
- 2.1 Use of Fired Bricks bearing Roman-Like Symbols [MGWb.14]
- 2.2 Departures from the Mayan Pyramid Style (e.g.; the "erratic mounds")
- 2.3 Presence of Human Burials in non-Mayan Style)
- 2.4 Inscribed Bricks Apparently Buried Ceremonially
- 2.5 Apparent Use of Roman Units of Measure
- 2.6 Use of Roman-Type Cement
- 2.7 Absence of Typical Mayan Ball Court
- 2.8 Discovery of Roman-Like Ceramic Head [MGPa.1]

MSP3 Anomalies of Palenque's Remarkable Temple of the Inscriptions
- 3.1 Style and Some Artifacts Similar to Egyptian
- 3.2 Use of the Lotus Motif (i.e.; Hindu and Buddhist affinities)
- 3.3 Apparent Use of Egyptian Units of Measure

MSP4 Anomalies of Teotihuacan's Pyramid of the Sun
- 4.1 Apparent Incorporation of Pi in Design
- 4.2 Curious Equinoctial Shadow Phenomenon
- 4.3 Use of Massive Sheets of Mica
- 4.4 Unknown Purpose of Long Tunnel beneath Pyramid
- 4.5 Strange Use of River Diversion, Canals, Conduits

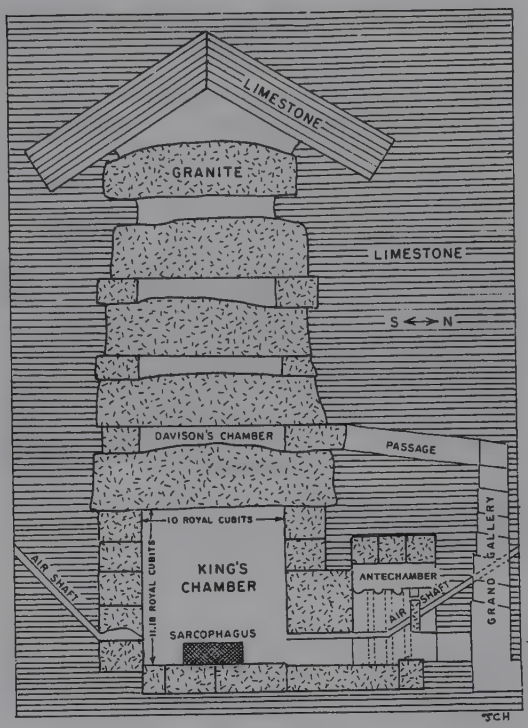
MSP5 The Great Pyramid: Statistics

and General Anomalistics

MSP6 Great Pyramid Anomalies: Material-Processing and Whole-Structure Enigmas
- 6.1 Loading and Shipping of 70-Ton Granite Blocks at Aswan
- 6.2 Lack of Scientific Consensus on How the Great Pyramid's Multiton Blocks Were Raised and Maneuvered into Place
- 6.3 The Logistics and Social Organization Required to Install One Multiton Block about Every 2-3 Minutes
- 6.4 The Method Used for the Precision-Shaping and Finishing of Large Granite Blocks
- 6.5 The Apparent Ability to Drill Rapidly in Hard Granite
- 6.6 The Claimed Air Bubbles, Excess Moisture, and Unusual Debris in Limestone Core Blocks
- 6.7 The Significance of the Creases in the Faces of the Great Pyramid
- 6.8 The Reason for Installing the Largest Blocks near the 35th. Tier Instead of Base

MSP7 Enigmatic Structures within the Great Pyramid
- 7.1 The Purpose and Users of the Well-Shaft and Grotto
- 7.2 The Purpose of the Subterranean Chamber and Pit
- 7.3 The Purpose of the Grand Gallery's High Ceiling, Strange Corbelling, Ramps, and Notched Holes
- 7.4 The Storage Place and Final Installation of Granite Plugs
- 7.5 The Purpose of the Queen's Chamber
- 7.6 The Source of the Layers of "Salt" in Queen's Chamber and Elsewhere
- 7.7 The Real Purpose of the Structurally Superfluous Relieving Chambers
- 7.8 The Source of the Black Dust Deposits
- 7.9 The Real Purpose of the So-Called "Air-Shafts" (One of which is blocked by a "door" followed by still another "door.)
- 7.10 The Purpose of the Sand-Filled Cavities

MSP8 The Great Pyramid as an Information Repository (e.g.; Pi and Golden Section)



The strangely constructed Kings Chamber in the Great Pyramid. (I.E.S. Edwards; The Pyramids of Egypt, 1972.) [MSP7]

MSR ANCIENT ROADS AND BRIDGES

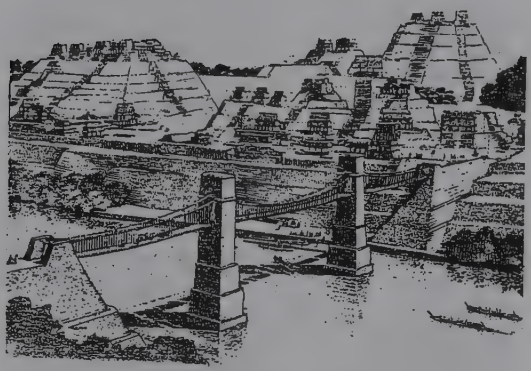
MSR1 Remarkable Ancient Roads: A Survey
- 1.1 Great Length (e.g.; Inca Road System)
- 1.2 Precocious Use of Macadam-Like Surfaces (e.g.; by the Maya)
- 1.3 Use of Grooved Pavement for Wheeled Vehicles (e.g.; on ancient Malta)
- 1.4 Engineering Sophistication Far Above That Accorded Today's Indigenous Peoples
- 1.5 Carrying Capacities Far in Excess of Supposed Needs (e.g.; Britain; Chaco Canyon)
- 1.6 Paved Roads in Unexpected Places (e.g.; Raratonga)

MSR2 The Puzzling Chaco Canyon "Roads" (e.g.; great lengths, straightness, alignments)

MSR3 The Bimini "Road": Artificial or Natural?

MSR4 The Maltese "Cart Ruts" (They may not have been used by carts!)

MSR5 Claimed Precocious Suspension Bridges (e.g.; Yaxchilan, Mexico)



Artist's rendition of the Mayan suspension bridge at Yaxchilan, Mexico. (Civil Engineering, p. 62, January 1995.) [MSR5]

MSS CITIES AND COMPLEXES

MSS1 Anomalous and Problematic Cities and Complexes: A Survey (e.g.; Quivera, Atlantis, Tennessee burnt city, Yonaguni))

MSS2 The Gungywamp Lithic Complex (Includes a chamber with an astronomically oriented light shaft.)

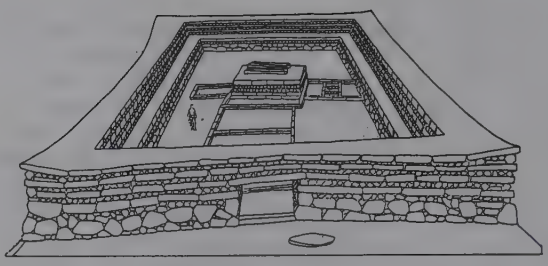
MSS3 Mystery Hill (America's "Stonehenge"): Potential Anomalies (e.g.; claimed inscriptions, Precolumbian radiocarbon dates)

MSS4 Curiosities of The Great Zimbabwe: A Unique Group of Stone Ruins in Subsaharan Africa

MSS5 Mohenjo-daro: The First Planned City (e.g.; claims of radioactivity and vitrification)

MSS6 Nan Madol: A Megalithic Venice in Micronesia (Impressive but not anomalous.)

MSS7 Large-Scale Order of Cities and Complexes (e.g.; Mayan geometrical territorial organization)



A mortuary on Nan Madol in Micronesia. The walls are made of basalt "logs" arranged in crosswise layers. (W.N. Morgan; Prehistoric Architecture in Micronesia, 1988.) [MSS6]

MST ANCIENT TOWERS

MST1 The Controversies Surrounding the Newport Tower in Rhode Island

MST2 Incongruous Towers of the North American Southwest (Apparently, they were forts of a sort.)

MST3 Chulpas: Stone Towers of South America (Impressive burial structures but not anomalous.)

MST4 Anomalies of Ancient European Stone Towers: A Survey
- 4.1 Uncertain Purpose of the Irish Round Towers
- 4.2 Why Were the Scottish Brochs Needed and Concentrated in Extreme North
- 4.3 Unknown Builders of the French "Mystery Tower"
- 4.4 Unknown Purpose(s) of the Balearic Island Talayots (Other than defense.)

MST5 Ancient Towers of the Middle East: Some Puzzles (e.g.; vitrification at the Tower of Babel)

MST6 The Unexpected Towers of Easter Island (Unpublicized and nonanomalous.)

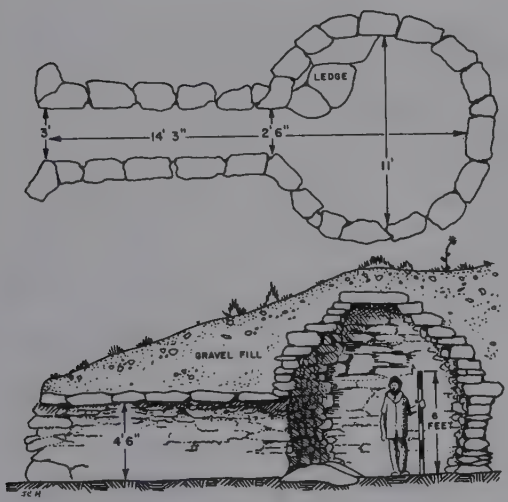
MSU ANOMALOUS STONE TOMBS, CHAMBERS, AND PASSAGE GRAVES

MSU1 The Controverted Stone Chambers of Northeastern North America (i.e.; some do not conform the the "root cellar" explanation)

MSU2 Remarkable Passage Graves (e.g.; Gavr'inis, New Grange)

MSU3 Remarkable Acoustical Properties of Neolithic Passage Graves

MSUa Curious U-Shaped Structures in New England



The stone chamber at Upton, Massachusetts. Architecturally, it resembles some chambers in Ireland and Scotland. (Early Sites Research Bulletin, 7:29, May 1979.) [MSU1]

MSW WALLS, EMBANKMENTS, DITCHES

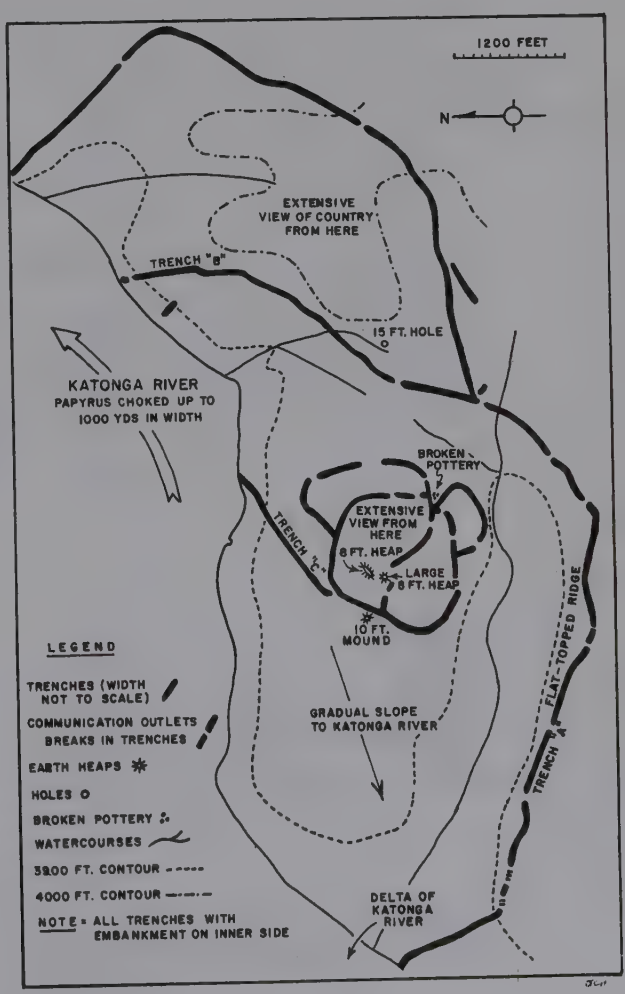
MSW1 Notable Linear Earthworks: A Survey (e.g.; Devil's Dyke, Britain)

MSW2 Notable Rude Stone Walls: A Survey (e.g.; East Bay Walls, California; Great Wall of Peru)

MSW3 Transocean Distribution of Precision-Fit Stone Walls (e.g.; Peru, Easter Island, Tonga)

MSW4 Cyclopean Walls (i.e.; walls of huge, roughly worked stones) (e.g.; Wall of the Dymaeans, Greece)

MSW5 Natural Walls That Seem Artificial (e.g.; Chatata Wall, Tennessee; Kaimanawa Wall, New Zealand)



(Right) Plan view of ancient trenches at Bigo, Uganda. (Antiquity, 33:54, 1959.) [MSW1]

P PSYCHOLOGY

PB DISSOCIATIVE BEHAVIOR
PH HIDDEN KNOWLEDGE
PI INFORMATION PROCESSING
PL HALLUCINATIONS AND DELUSIONS
PP PSYCHIC BIOLOGY
PS PSYCHOKINESIS

PRIMARY SCIENCE SOURCES EXAMINED IN PSYCHOLOGY

American Journal of Clinical Hypnosis (28 vols.)
American Journal of Psychiatry (158 vols.)
American Journal of Psychology (89 vols.)
Archives of General Psychiatry (35 vols.)
British Journal of Psychology (92 vols.)
Journal of Abnormal Psychology (111 vols.)
Journal of Clinical Hypnosis (36 vols.)
Journal of Experimental Psychology (55 vols.)
Journal of General Psychiatry (63 vols.)
Journal of Nervous and Mental Disease (190 vols.)
Journal of Psychology (109 vols.)
Perceptual and Motor Skills (88 vols.)
Psychological Bulletin (72 vols.)
Psychological Reviews (86 vols.)
Psychosomatic Medicine (43 vols.)
Society for Psychical Research, Journal (32 vols.)
Society for Psychical Research, Proceedings (46 vols.)

PB DISSOCIATIVE BEHAVIOR[26]

PBA AUTOMATIC COMMUNICATION
PBD COMMUNICATED HYSTERIA AND DELUSIONS
PBH HYPNOTIC BEHAVIOR (GENERAL FEATURES)
PBJ DEJA-VU PHENOMENA
PBM MULTIPLE PERSONALITY PHENOMENA
PBP POSSESSION
PBS ALTERED STATES OF CONSCIOUSNESS
PBZ ANOMALOUS SLEEP AND DREAM PHENOMENA

By far the most common types of "psychic behavior" are classified as "dissociated states." Dissociative behavior occurs when normal conscious behavior is modified, sometimes overwhelmed, by subsidiary mental activity. A second self seems to control the hand of the automatic writer and the speaker's tongue in glossolalia. On occasion, the secondary personality will even take over bodily activity, leading to to cases of possession and multuiple personality. Dreams, sleep-walking, fugues, and hypnotic phenomena are all manifestations of dissociative behavior in which the waking mind is pushed into the background.

Many curious and difficult-to-explain phenomena can arise in the dissociative state. Some these seem real enough, especially to those experiencing such deviations from what we define as normality. However, the mind can be easily hoodwinked. Further, phenomena in this class can easily be hoaxed.

A few of examples dissociative behavior likely to attract the interest of the anomalist follow.

- Claims of glossolalia in languages foreign to the speakers;
- The power of post-hypnotic suggestion;
- The psychological roots of the deja-vu phenomenon;
- The possible existence of an "ultraconsciousness";
- The apparent lack of biological need for sleep:
- The evolutionary origin and need for dreaming;
- Claims of creative, "eureka" dreams;
- The "break-off" phenomenon experienced by pilots; and
- Group dreaming in which several people experience the same dream.

PBA AUTOMATIC COMMUNICATION

PBAa Automatic Writing (Such writing may be performed while the writer is otherwise occupied.) [PBZu]
a.1 Anecdotal Evidence (Entire books of automatic writing exist.)
a.2 Claims of Telepathic Automatic Writing (i.e.; writer receives information from a distant sender) [PBHe]

PBAb Automatic Drawing (Some talent shown occasionally.)

Three sketches drawn automatically. (Popular Science Monthly, 64:195, 1904.) [PBAb]

Two automatic drawings. (Journal of Abnormal Psychology, 14:369, 1920.) [PBAb]

PBAc Mechanical Devices Employed in Automatic Communication (e.g.; planchettes, ouija boards, pendulums)

PBAd Voice Automatisms
- d.1 Glossolalia (Or "speaking in tongues.")
- d.2 Xenoglossy (i.e.; glossolalia in a language foreign to speaker) [PHRc]

PBAe Channeling

PBD COMMUNICATED HYSTERIA AND DELUSIONS

PBDa Mass Hysteria
- a.1 Fainting Epidemics
- a.2 Dancing Manias (e.g.; St. Vitus Dance, Taranttellas)
- a.3 Religious-Revival Phenomena
- a.4 Mystery-Gas Hysteria
- a.5 Kissing-Bug Hysteria
- a.6 Arctic Hysteria (i.e.; in the Arctic, the very long days bring on bouts of feverish activity)

PBDb Folie à Deux (i.e.; contagious neuroses) (More than two people may be involved--- even pets!)

PBDc Explosive-Type Hysterias
- c.1 Jumpers (e.g.; the famous jumpers of Maine)
- c.2 Sound-Precipitated Hysteria

PBDd Latah Phenomena (i.e.; startle reaction plus shouted profanities)

PBDe Mass Delusions (e.g.; the Indian Messiah, miracle-men, UFO cults, number-four phenomenon)

PBDf Capgras' Syndrome (i.e.; delusion that doubles of other people exist, not to be confused with doppelgangers)

PBDg Memes (i.e.; societal traits and ideas that are "contagious" and may evolve in a Darwinian sense) (e.g.; altruism)

PBDh Epidemic Psychoses (e.g.; in western Ireland, the anomalously high incidence of some psychoses) (e.g.; schizophrenia, bipolar disdisorder)

PBDi Amok and Berserk Hysterias (i.e.; sudden murderous rages)

PBDj Scientific Delusions
- j.1 Reich's Cloud-Busting
- j.2 Blondlot's N-Rays
- j.3 Reichenbach's Magnet Experiments

PBH HYPNOTIC BEHAVIOR (GENERAL FEATURES)

PBHa Unusual General Characteristics of the Phenomenon
- a.1 Reliance on Left-Brain Dominance
- a.2 Electromagnetic Effects
- a.3 Instigation of Antisocial and Criminal Actions (Hypnosis is not as innocuous as claimed.)
- a.4 Comparison of Hypnosis with Yoga
- a.5 Reality of Hypnosis as a Distinct Phenomenon Questioned [PBHb.4]
- a.6 Hypnotic Effect of Drums and Other Repetive Phenomena [PBHc]

PBHb Posthypnotic Phenomena
- b.1 Claimed Efficacy of Hypnosis in Controlling a Subject's Later Actions
- b.2 Deterioration of Posthypnosis with Time
- b.3 Posthypnotic Amnesia
- b.4 Reality of All Posthypnotic Phenomena Questioned [PBHa.5]

PBHc Spontaneous Hypnosis (i.e.; "fascination" in humans) [PBHa.6]

PBHd Claimed Effects of Magnetism on Hypnotic States

PBHe Claims for Hypnosis by Tele-

pathy [PBAa]

PBHf Possible Effects of Hypnosis on Consciousness [PIKb]

PBJ DEJA-VU PHENOMENA

PBJa General Characteristics (i.e.; I've seen all this before!)

PBJb Deja Vu Associated with Synathesia [PIBh]

"I've been here before." J. Holden's artistic concept of the deja-vu phenomenon. (American Journal of Psychology, 24:52, 1913.) [PBJa]

PBM MULTIPLE PERSONALITY PHENOMENA

PBMa General Characteristics

PBMb Multiple Personality Associated with Xenoglossy [PBAd.2]

PBMc Hypnosis Evokes Secondary Personalities

PBMd Multiple Personality and Schizophrenia

PBMe Brain Waves of Persons Claiming Multiple Personalities

PBMf Reality of Multiple Personality Questioned

PBMg Multiple Personality Associated with Epilepsy

PBMh Relation of Multiple Personality to Possession

PBMi Possible Duality of Consciousness under Anesthesia

PBP POSSESSION

PBPa Ritual Possession (e.g.; group serpent handling)

PBPb Spirit/Demon Possession

PBPc Animal Possession (e.g.; lycanthropy)

PBPd Hexes and the Evil Eye Claims

PBPe Witchcraft Claims

PBPf Zombiism

PBPg Windigo Psychosis (i.e.; psychotic state involving cannibalism)

PBPh Possession and Claimed Acquisition of Paranormal Knowledge

PBPi Voodoo [PPDa]

PBPj Birth Defects Attributed to Cursing

PBS ALTERED STATES OF CONSCIOUSNESS

PBSa Sensory Deprivation Phenomena (e.g.; hallucinations) [PLGb]

PBSb Peak Experiences (Also called: Exceptional Human Experiences or EHEs) [PBSi, PLGi]

b.1 Religious Conversion

b.2 Ecstasy (This state can be induced by many things, including drugs.)

b.3 Exciting Sports Events

b.4 Choral Singing and Group Dancing

b.5 Riots

b.6 Battle

PBSc Spontaneous Neural Activity (i.e.; the kaleidoscopic brain)

PBSd Brain Waves during Altered States

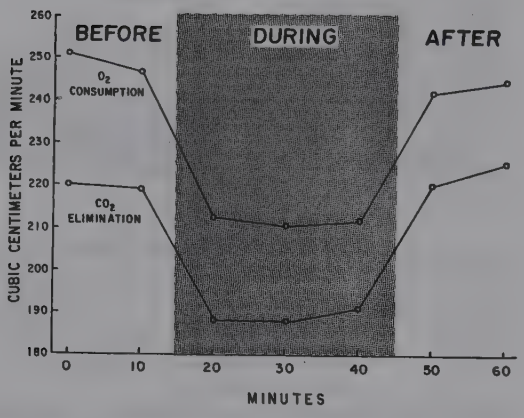
PBSe Effect of Magnetism on Altered States

PBSf General Characteristics of ASC

PBSg Break-Off Phenomenon (As experienced by pilots.)

PBSh The Ultraconscious (i.e.; a distinctive state supposed to exist beyond the unconscious) [PBSk]

PBSi Transcendental States [PBSb]
i.1 Mystical Experiences
i.2 Transcendental Meditation



Effects of meditation upon oxygen consumption and carbon-dioxide elimination. (Scientific American, 226:85, February 1972.) [PBSi]

PBSj Trances, Mediumship, Spiritualism, Seance Phenomena
j.1 Cayce-Type "Readings"
j.2 Apparitions [PLGa]
j.3 Seance Phenomena Debunked
j.4 Materializations (e.g.; ectoplasm)
j.5 Communications with the Dead
j.6 Conjured Ghosts (e.g.; the Philip phenomenon)

PBSk The Unconscious Mind (i.e.; the "subconscious") [PBSh]

PBSl Methods for the Deliberate Induction of ASC

PBZ ANOMALOUS SLEEP AND DREAM PHENOMENA

PBZa The Apparent Need to Dream
a.1 Neurological Aspects (e.g.; "memory-clearing") [PBZe, PBZo, PBZs]
a.2 Conjectures on the Biological Evolution of the Dreaming Phenomenon (i.e.; survival?)

PBZb Hypnotically Induced Dreams

PBZc Phenomena of Somnambulism (i.e.; even the driving of automobiles)

PBZd Lucid Dreams [PLGj]
d.1 Lucid-Dream Content
d.2 Lucid-Dream Control

PBZe Unknown Psychological Significance of Dreaming [BHF31, PBZa]

PBZf Some Curious Nonanomalous Features of Sleeping and Dreaming (e.g.; "head snaps")

PBZg Sleep Paralysis

PBZh Group Dreaming (i.e.; other individuals have the same dream)

PBZi Telepathic Dreams [PHTa.10]

PBZj Precognitive Dreaming [PHPa.7]

PBZk Paranormal Dreams (e.g.; remote-viewing, problem solving) [PBZi, PBZj, PBZr]

PBZl Dreams Accompanied by Kaleidoscopic Images

PBZm Recurring Dreams

PBZn Differences between Male and Female Dreams

PBZo Effects of Dream Deprivation [PBZa]

PBZp Sleep Talking (Survey of Subject Matter)

PBZq Nightmares
q.1 General Characteristics
q.2 Efficacy of Hypnotic Relief

PBZr Creative, Insightful Dreams [PIGb.4]

PBZs Apparent Lack of a Biological Need for Sleep [BHF31, PBZa, PBZe]

PBZt Dreams of the Blind
t.1 When Blinded during Life
t.2 When Blind at Birth

PBZu Dream Writing and Drawing PBAa, PBAb]

PBZv Dream Clairvoyance [PHPa.7]

PBZw Dreams Associated with Suicide

PBZx Ability to Awaken at Pre-Set a Time [PICc.1]

PBZz Dream Information Processing

PBZaa Hypnagogic and Hypnopompic Phenomena [See PLF.]

PH HIDDEN KNOWLEDGE[26]

PHD DIVINING HIDDEN MATERIALS AND OBJECTS
PHP VISIONS OF THE PAST AND FUTURE
PHR EVIDENCE FOR REINCARNATION
PHT ANOMALOUS TRANSFER OF INFORMATION

Telepathy, precognition, and divination are now and always have been cornerstones of parapsychology. Since time immemorial, some individuals have claimed that they can gain information that is physically hidden, residing in the brains of others, or located in the future. According to the tenets of science, the acquisition of such data is impossible and, therefore, would be highly anomalous. Consequently, such claims have always been subjected to the closest scientific scrutiny, if not rejected outright. In fact, many reviews of representative parapsychological experiments and anecdotes have resulted in charges of fraud, sloppy science, and bad statistics. Indeed, it seems as if every "hidden knowledge" phenomenon can be simulated by a good magician! It may be that the phenomena of this section cannot pass the tests imposed by science. However, on the positive side, there do exist some experiments conducted by highly qualified teams of scientists in the areas of remote-viewing and telepathy that seem on the verge of passing these tests. In addition, even the most conservative observer has to be amazed at the truly vast amounts of favorable anecdotes that have accumulated in, for example, water-divining and reincarnation. Should we reject all such claims?

PHD DIVINING HIDDEN MATERIALS AND OBJECTS

PHDa Water Divining
- a.1 Dowsing Anecdotes (There are a surprising number of success stories.)
- a.2 Controlled Dowsing Experiments (i.e.; generally unsuccessful)
- a.3 Physiological Effects Experienced by Dowsers (e.g.; muscle spasms, staggering, vomiting)

PHDb Experiences in Divining Other Natural Materials
- b.1 Petroleum
- b.2 Specific Minerals
- b.3 Electric Power Cables
- b.4 "Earth-energy" Paths
- b.5 Metal Pipes [PHDa.2]

PHDc Locating Concealed but Known Objects (e.g.; party games, forensic parapsychology)

PHDd Locating Concealed but Known Individuals (e.g.; party games, forensic parapsychology)

PHDe Divining the Location, Identity, and Nature of Hidden Objects

Old sketch demonstrating how to use the Bleton method of water-divining. (Journal of American Folk-Lore, 4:241, 1891.) [PHDa]

e.1 Card guessing (e.g.,; Zener card tests)
e.2 Forensic Parapsychology
e.3 Psychic Archeology
e.4 Psychic Physics (i.e.; divining nuclear structure)

PHDf Claimed Dermo-Optical Perception (i.e.; reading ordinary text with one's fingers while blindfolded) [BHT8]

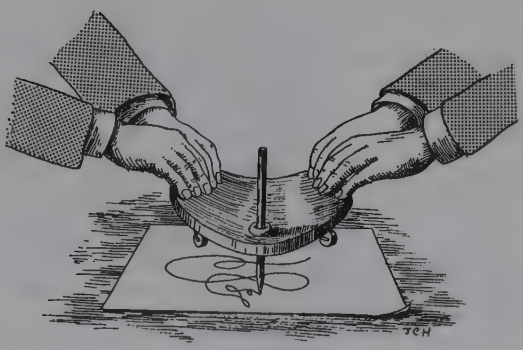
PHDg Clairvoyance, Remote-Viewing
g.1 Experiments (Apparently significant results at Stanford Research Institute and the PEAR project at Princeton.)
g.2 Effect of Geomagnetism on Remote Viewing [PHPa.4, PHTa.4, PIGa.8]
g.3 Remote Viewing in Dreams (See PBZv.)

PHDh ESP/PSI: General Features, History, and Debunking

PHDi Clairsentience (i.e.; feeling at a distance)

PHDj Object Reading (i.e.; psychometry)

PHDk Skrying
k.1 Use of Crystal Balls
k.2 Use of Other Mediumistic Aids



Typical method of using the planchette. (Scientific American, 19:17, 1860.) [PHDk]

PHDl Clairaudience (i.e.; hearing at a distance)

PHDm Eyeless Sight [BHT3]

PHDn Animals Sensing the Imminent Return of Owners [PHTc]

PHP VISIONS OF THE PAST AND FUTURE

PHPa Precognition and Prophecy
a.1 Anecdotal Evidence of the Phenomena during Normal Mental States
a.2 During Trances
a.3 Under Hypnosis [PIMb.6]
a.4 Phenomena Affected Affected by the Geomagnetic Field [PHDg.2, PHTa.4, PIGa.8]
a.5 Prophecy and Revelation (i.e.; precognition of the distant future) (e.g.; Nostradamus, Book of Revelations, etc.)
a.6 Prediction of the Outcomes of Random Processes (e.g.; dice, random-number generators)
a.7 Precognition during Dreams (See PBZj]
a.8 Precognition during NDEs (i.e.; Near-Death Experiences) [PLDd]

PHPb Track Record of Augury (i.e.; precognition using props) (e.g.; crystal balls, entrails, Tarot cards, etc.)

PHPc Predisaster Syndromes (e.g.; Three-Mile Island)

PHPd Premonitions of Death (e.g.; Lincoln) [PHPa]

PHPe Retrocognition [PIM]
e.1 Anecdotal data
e.2 Hypnotic Regression (e.g.; elucidation of past lives, UFO abductions) [PIMb.4]

PHR EVIDENCE FOR REINCARNATION

PHRa Claims of Memories of Past Lives

PHRb Birthmarks "Carried Over" from Past Lives

PHRc Xenoglossy as Evidence of Reincarnation (See PBAd.2)

PHRd Use of Hypnosis in Verifying Reincarnation (See PHPe.2)

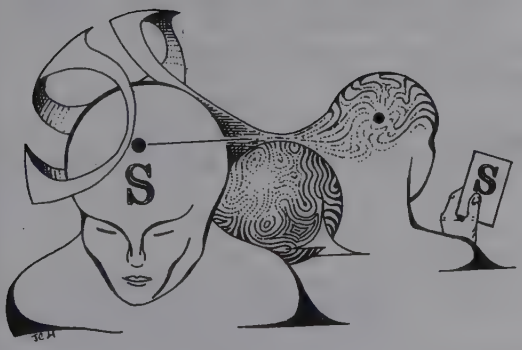
PHT ANOMALOUS TRANSFER OF INFORMATION

PHTa Telepathy (i.e. mental transfer of information between people and, perhaps, animals)
- a.1 Telepathy Anecdotes (Here, there are literally thousands of claims.)
- a.2 Laboratory Experiments (e.g.; the Ganzfield experiments and many, many others)
- a.3 Mass Experiments Using the Media (e.g.; radio experiments)
- a.4 Effects of the Geomagnetic Field upon Telepathy Results [PHDg.2, PHPa.4, PIGa.8]
- a.5 Possible Connection of Telepathy with Quantum Mechanics
- a.6 Telepathy under Hypnosis
- a.7 Atavistic Nature of Telepathy (i.e.; it may represent traces of a degenerate capability)
- a.8 Twin Telepathy
- a.9 Telepathy Debunked (See PHDh.)
- a.10 Dream Telepathy (See PBZi)
- a.11 Telepathy's Association with and Neuroses
- a.12 Telepathy Associated with Genius [PIGa.6]

PHTb Transfer of Physiological Sensations (e.g.; odor, taste, EKGs) [PHDi]

PHTc Claims of Animal Telepathy
- c.1 Animal-to-Animal
- c.2 Human-to-Animal
- c.3 Animals Sensing Imminent Return of Their Owner (See PHDn.)

PHTd Staring Phenomeon (i.e. claimed detection of someone unseen staring at you)



J. Holden's artistic interpretation of telepathy. (Nature, 251:602, 1974.) [PHTa]

PI INFORMATION PROCESSING[26]

PIB INPUT/OUTPUT ANOMALIES
PIC INFORMATION-PROCESSING ANOMALIES
PIG MYSTERIES OF GENIUS AND CREATIVITY
PII EIDETIC AND AFTER-IMAGES
PIK CONSCIOUSNESS
PIM MEMORY ANOMALIES

The mind of the normal individual stores and processes immense amounts of information in ways that are not fully understood. Comparisons with modern digital computers have not been of much help in furthering an understanding. Even more perplexing is the abnormal mind, or the normal mind in an altered state. Indeed, the so-called "idiot savants" seem to tap faculties deep within the human brain that may actually belong to everyone, if only we knew how to access them. Such cryptic talents are seen again in the apparent ability of the subconscious mind to process information independently of the conscious mind.

It is in this section of the Outline that we encounter mental phenomena that are relatively easy to study and even quantify. With the close attention of science, human information-processing abilities, such as those noted below, become even more remarkable.

- Synathesia phenomena;
- The existence of savants in mathematics, music, mechanical design, and other types of information-processing;
- The existence of geniuses, especially the so-called "magical" geniuses;
- The existence of eidetic imagery, especially in children;
- The mystery of consciousness;
- The existence of remarkably capacious memories; and
- The effects of hypnotism and other altered states upon memory and information-processing.

PIB INPUT/OUTPUT ANOMALIES

PIBa Word Blindness (i.e.; inbility to recognize words even if able to write them) [PIBg]
PIBb Incredible Rapid-Typing Skill
PIBc Tip-of-the-Tongue Phenomenon
PIBd Mirror-Script Phenomena
- d.1 Reading Mirror Script
- d.2 Writing Mirror Script
- d.3 Relation to Handedness

PIBe Visual Illusions [PIBo]
- e.1 Length Illusions (e.g.; elongation illusions)
- e.2 Horizonality Illusions
- e.3 Shape Illusions
- e.4 Blindness to Changes in the visual field
- e.5 Human-Built Environmental Illusions (e.g.; Oregon Vortex, Santa Cruz Mystery Spot, and many more)
- e.6 Natural Environmental Illusions (e.g.; Florida's Spook Hill and many more) [GGHa]
- e.7 The Moon Illusion (i.e.; Why does it appear larger near the horizon?)
- e.8 Amorphic Images (i.e.; objects recongizable only when seen from specific angle)
- e.9 Trick of the Indian Rope Trick
- e.10 Spoon-Bending Phenomena (e.g.; Uri Geller claims, etc.)
- e.11 Claims of Psychic Surgery
- e.12 Levitation Demonstrations (e.g.; Home's tricks, many historical "miracles," common

party trick)
e.13 Hot-Coal Eating Tricks

PIBf Apparent Ability to Generate Random Numbers

PIBg Cocktail-Party Effect
g.1 In a Speech Environment
g.2 Inattentional Blindness to Words [PIBa]

PIBh Synathesia Phenomena
h.1 Word Synathesia
h.2 Music Synathesia
h.3 Pain Synathesia
h.4 Association with Deja Vu [PBJb]

PIBi Unusual Information Processing in Braille Readers

PIBj Inability to Describe Certain "Things"
j.1 Animals
j.2 Ends of Words

PIBk Autism (i.e.; strange aloneness and alienation of humans, often accompanied by remarkable, specialized talents))

PIBl Information Processing in People with Partial Brains

PIBm Dyslexia
m.1 General Characteristics
m.2 Language-Specific Cases

PIBn Stuttering Phenomena

PIBo Non-Visual Illusions [PIBe]
o.1 Touch
o.2 Audio
o.3 Taste
o.4 Smell
o.5 The Distinguishing Sounds of Shapes (The ability of some to distinguish the shape of an object by the sound made by striking it.)

PIBp Attentional Blanks (i.e. attentional "dead time" after a stimulus)

PIBq Musical Deafness (i.e.; analogous to word blindness) [PIBa]

PIBr Hard-Wired Responses to Specific Inputs
r.1 The "Carrot Phenomenon" (i.e.; the curious, common response voiced after a series of simple math questions)
r.2 The "Blue-Seven" Phenomenon (i.e.; widespread "favorite" color and number)

PIC INFORMATION-PROCESSING ANOMALIES

PICa Idiot Savants (i.e.; individuals with great talents in narrow areas but notably deficient

J. Holden's artistic concept of a calculating prodigy. (American Journal of Psychology, 4:1, 1891.) [PICa]

elsewhere) [PICb, PIG]
a.1 Mathematical Capabilities
a.2 Calendar Calculators
a.3 Mechanical Savants
a.4 Musical Savants
a.5 Remarkable Memories of Savants [PIMa.1]
a.6 Presence of Savants with Eidetic Memories [PII]

PICb Intellectual Prodigies (i.e.; normal individuals with exceptional talents, often at early ages) [PIG]
b.1 Musical Prodigies (e.g.; Mozart)
b.2 Chess (e.g.; many of the chess masters)
b.3 Mathematics (e.g.; A.C. Aitken)

PICc Subconscious Information Processing [PICd]
c.1 Time Reckoning [PBZx]
c.2 Subconscious Language Translation

PICd Information Processing during Sleep [PBZz]

PICe Accelerated Mental Processes (Drugs, hypnotic suggestion, danger, etc.)
PICf Influence of Hypnosis upon Information Processing
f.1 Post-Hypnotic Learning
f.2 Post-Hypnotic Memory [PIMb]
PICg Innate Information-Processing Abilities (Human brains seem to be uniquely configured for information processing by evolution.)
PICh Sign Language Processed in Right Hemisphere (i.e.; the opposite of written language)
PICi Musicians' Brains Configured Differently
PICj Intelligence Shrinkage If Not Used
PICk Unusual Characteristics of Injured or Degenerated Brains
k.1 Injured Brains and One-Hemisphere Brains Function Surprisingly Well
k.2 Brain-Injured Persons Can Spot Lies More Easily
k.3 Unrealized Talents Arise from Degenerating Brains (e.g.; emergence of long-suppressed artistic talents)
PICl Emotional Language Recalled Better If Left Ear Is Used

PIG MYSTERIES OF GENIUS AND CREATIVITY

PIGa Genius
a.1 Early Appearance [PICb]
a.2 Genius Associated with Mental Illnesses
a.3 Origin and Nature of Strokes of Genius
a.4 Genius Correlated with Time of Birth [BHB35]
a.5 "Magical" Geniuses (e.g.; the Indian mathematician Ramanujan)
a.6 Association of Genius with Telepathic Abilities [PHTa.12]
a.7 Eccentricities of Genius (e.g.; N. Tesla]
a.8 Magnetic Stimulation of Intellectual Faculties [PHDg.2, PHPa.4, PHTa.4]
PIGb Creativity
b.1 Creativity Associated with the Sense of Humor
b.2 Periodicity in Creativity (e.g.; the explosion of European culture circa 40,000 B.P.) [BHA2, MADc, MGPo]
b.3 Relationship between Creativity and Aesthetics
b.4 Creativity in Dreams [PBZj]
b.5 Creativity Associated with Mental Illnesses (e.g.; schizophrenia)
PIGc Nature and Accuracy of Intuition
PIGd Today's Artificial Intelligence Compared to Human Capabilities (Speculations about future comparisons.)

PII EIDETIC AND AFTER-IMAGES

PIIa Eidetic Images (i.e.; detailed visual information persisting long after removal of viewed object)
a.1 Anecdotal Accounts of Phenomenon
a.2 Association with Mental Retardation [PICa]
a.3 Association with Hallucinations [PLGm]
a.4 Hypnotic Induction and/or Recovery of Capability
a.5 Frequency and Age-Distribution of Phenomenon
a.6 Appearance of Eidetic Imagery in Diseases and Psychoses
a.7 Loss of Capability with Age
a.8 Evaluation of the Accuracy of Eidetic Images
a.9 Alpha Rhythms during Eidetic Imaging
a.10 Relationships between Eidetic Images, Hallucinations, and After Images [PLGa.15]
PIIb Anomalously Vivid Afterimages

PIK CONSCIOUSNESS

PIKa Origin and Nature of Consciousness
a.1 Evolutionary Paradoxes of Consciousness (See BHT22.)
a.2 Relationship between Consciousness and Paranormal Phenomena

a.3 Definition and General Characteristics
a.4 Brain's Neural Basis for Existence of Consciousness
a.5 Relation to the Subconscious [PIKe]
a.6 Relation to the Ultraconscious [PIKf]
a.7 Lack of Measurable Biologi- Parameters Defining Consciousness

PIKb Consciousness Affected by Hypnosis [PBHf]

PIKc Quantum Mechanics Relation to Consciousness

PIKd Free Will
d.1 Existence Question (It is impossible to demonstrate that we are not programmed biological machines.)
d.2 Neural Limitations

PIKf The Ultraconscious (i.e.; consciousness expanded) (e.g.; Buddhist nirvana)

PIKg Unknown Genetic Basis for Consciousness

PIKh Does Consciousness Exist in Other Animals?

PIKi Existence of a Collective, "Global" Consciousness (Conceivably, this could include other biological entities and perhaps more!)

PIM MEMORY ANOMALIES

PIMa Memory Capacity
a.1 Anecdotes of Unusually Large Memories [PIMe]
a.2 So-Called "Photographic" Memories [PIIa]
a.3 Memories of Savants [PICa]
a.4 Relationship to Eidetic Memories [PIIa]
a.5 False-Memory Syndrome
a.6 Memory Enhancement during Danger and Emotional States
a.7 Nonhypnotic Creation of False Memories
a.8 Possible Dual Nature of Memory
a.9 Memory Activity Seen with Positron-Emission Tomography
a.10 Reliability of Infantile Memory
a.11 Memory Enhancement in Disease
a.12 Hypernesia (i.e.; abnormally acute memory)
a.13 Claims of Prenatal Memory
a.14 Highly Specific Memory Losses (e.g.; inability to recite the names of fruits, certain tenses of verbs, etc.)
a.15 Memory Enhancement in Left-Handed Persons
a.16 Memory's Possible Connection to Morphic Resonance

PIMb Hypnosis and Memory
b.1 Hypnotic Memory Enhancement (i.e.; hypernesia) [PICf.2, PIMa.12]
b.2 Hypnotic Memory Creation (i.e.; pseudomemory)
b.3 Misrecall under Hypnosis
b.4 Age-Regression under Hypnosis [PHPe.2]
b.5 Post-Hypnotic Amnesia [PIMf]
b.6 Hypnotic Age-Progression [PHPa.3]
b.7 Hypnotic Identification of Amnesia Victims [PIMf]
b.8 Hypnotic Recovery of Forgotten Language

PIMc Claims of Inherited Memories

PIMd Cryptonesia (i.e.; the power of the mind to recall things of which there is no conscious memory)

PIMe Mnemonists (e.g.; their memory feats) [PIMa.1]

PL HALLUCINATIONS AND DELUSIONS[26]

PLD NEAR-DEATH EXPERIENCES (NDEs)
PLF HYPNAGOGIC AND HYPNOPOMPIC ILLUSIONS
PLG HALLUCINATIONS AND APPARITIONS
PLO OUT-OF-THE-BODY EXPERIENCES (OBEs)

Hallucinations or images that do not exist in the objective sense form the foundation of a large group of strange mental phenomena. Information about hallucinations comes almost entirely from personal testimony. This body of knowledge is, therefore, highly subjective, and cannot be tested easily for validity like the claims for dowsing and telepathy. The idiosyncracies of human perception, the subject's imagination, and outright fraud muddy the scientific waters here. Nevertheless, the immense store of anecdotes concerning hallucinations and illusions suggest that some people really believe that they see, hear, feel, taste, and otherwise sense nonexistent "things."

The following list highlights some of the more interesting and puzzling phenomena in this area of psychology.

- The existence of hallucinations among the blind;
- The odd nature of hypnagogic and hypnopompic illusions;
- Lilliputian illusions;
- Disease-induced hallucinations;
- Negative hallucinations; and
- Experimentally induced OBEs (Out-of-the-Body Experiences).

PLD NEAR-DEATH EXPERIENCES (NDEs)

PLDa Anecdotal Data
a.1 Typical Experiences
a.2 Critical Views of Claimed Phenomenon
PLDb Connection to Reincarnation [PHR]
PLDc NDEs among the Blind
PLDd NDEs and Prophecy [PHPa.9]
PLDe "Depersonalization" during Extreme Danger
PLDf Involuntary Memories during Injury or Illness

PLF HYPNAGOGIC AND HYPNOPOMPIC ILLUSIONS

PLFa Hypnagogic Illusions (i.e.; images experienced between waking state and going to sleep) [PBZaa]
a.1 Anecdotal Data
a.2 EEG Activity during the Hypnogogic State
PLFb Hypnopompic Illusions (i.e.; images experienced between the sleeping and waking state)
b.1 Anecdotal Data
b.2 Use of Hypnotism to Alleviate Affliction

PLG HALLUCINATIONS AND APPARITIONS

PLGa Spontaneous Visual Hallucinations
a.1 Autoscopic Hallucinations (i.e.; seeing one's double)
a.2 Negative Hallucinations (i.e.; not seeing what is there)
a.3 Ghosts, Haunts, etc.
a.4 Angels, Religious Entities
a.5 Aliens, Extraterrestrials, Abductions [XUXb]
a.6 Imaginary Companions
a.7 Unidentified Aerial Machines [PLGi, XUA]
a.8 Men-in-Black
a.9 Weeping Statues, etc.
a.10 Fairies, other Elementals

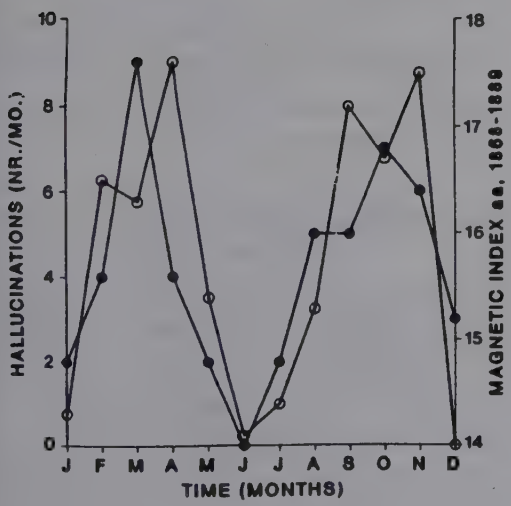
a.11 Recurrent Hallucinations (i.e.; repeated images of objects recently seen) (e.g.; apples after apple-picking)
a.12 Lilliputian Hallucinations (i.e.; "micropsia," when things seem abnormally small)
a.13 Macropsia (i.e., things seem abnormally large)
a.14 Teleosia (i.e.; things seem abnormally distant)
a.15 Eidetic Imagery [PIIa.10]

PLGb Hallucinations during Sensory Deprivation
b.1 Visual
b.2 Auditory
b.3 Tactual

PLGc Hallucinations during Life-Threatening Situations
c.1 Hostage Conditions
c.2 Trapped Miners
c.3 Near-Drowning

PLGd Hallucinations Induced by Artificial Devices [PHPb]
d.1 Crystal Balls (i.e.; scrying) [PHDk]
d.2 Mirror-Gazing
d.3 Tape Recorders (e.g.; the so-called "Raudive voices")
d.4 Telephones
d.5 Magnets

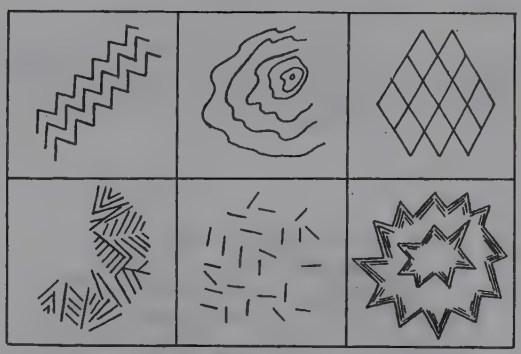
PLGe Hallucinations Induced by Natural Conditions (e.g.; geomagnetic field) [PIGa.8]



Annual variation of hallucination-frequency versus geomagnetic activity. (Bioelectromagnetics, 12:67, 1991.) [PLGe]

PLGf Disease-Induced Hallucinations
f.1 Migraine
f.2 Epilepsy
f.3 Extreme Pain
f.4 Schizophrenia
f.5 Extreme Psychoses (e.g.; severe depression)
f.6 Music Induced by Injury (e.g.; especially to the head)
f.7 Hallucinations Accompanying Severe Loss of Sight

PLGg Drug-Induced Hallucinations



Types of visual hallucinations experienced during controlled intoxication with cocaine. (Scientific American, 237:132, October 1977.) [PLGg]

PLGh Imagery Induced Hypnotically
h.1 Negative Hallucinations
h.2 Sex-Change Hallucination
h.3 Color-Vision Effects [See BHO5, PPHe.4.]

PLGi Hallucinations Induced during Mass Gatherings
i.1 Religous Events (e.g.; the 1906 Welsh Lights) [GLN1]
i.2 Non-Religious Rituals
i.3 Riots

PLGj Conjurable and Manipulatable Hallucinations [PBZd]

PLGk Unusual Auditory Hallucinations
k.1 Non-Vocal Speech
k.2 Sub-Vocal Speech
k.3 Automatic Speech Associated with Schizophrenia
k.4 Night Noises

PLGl Seance Phenomena [See PBSj.]

PLGm Hallucinations Related to Eidetic Images [PIIa.3]

PLGn Collective Hallucinations
n.1 Reciprocal Hallucinations

(i.e.; same images seen by a few separated individuals)
n.2 Mass Hallucinations (e.g.; the "angels at Mons" during World War I)

PLO OUT-OF-THE-BODY EXPERIENCES (OBEs)

PLOa Anecdotal Data (i.e.; an altered state during which one seen to leave one's body and travel)
PLOb OBEs during Illnesses (e.g.; schizophrenia)
PLOc Experiments Designed to Detect the Presence of a Person Experiencing an OBE
PLOd Experimental Induction of OBEs

The arrow points to that part of the brain's right hemisphere where OBEs can be induced electrically. (Nature, 419:269, 2002.) [PLOd]

PP PSYCHIC BIOLOGY[26]

PPC CANCER AND THE MIND
PPD PHENOMENA ASSOCIATED WITH DEATH
PPE PREGNANCY AND THE MIND
PPG PSYCHOGENIC THERAPIES [PPH]
PPH HEALTH, HYPNOSIS, AND OTHER PSYCHOGENIC PHENOMENA
PPI IMMUNE SYSTEM AND PSYCHOLOGY [BHI5]
PPS PSYCHOGENIC SKIN PHENOMENA

Of course, everyone realizes that one's mental attitude can affect one's health. In fact, so-called "alternative medicine" is big these days. This section actually deals rather cursorily with most aspects of psychosomatic medicine. Instead, the focus is on some more-peculiar anomalies, such as those following:

- Death and the "birthday" effect;
- The couvade and male "pregnancy";
- The efficacy of prayer on health;
- Hypnotism and color-vision phenomena;
- Hypnotism and the control of bleeding;

PPC CANCER AND THE MIND

[See also: BHH23-35]

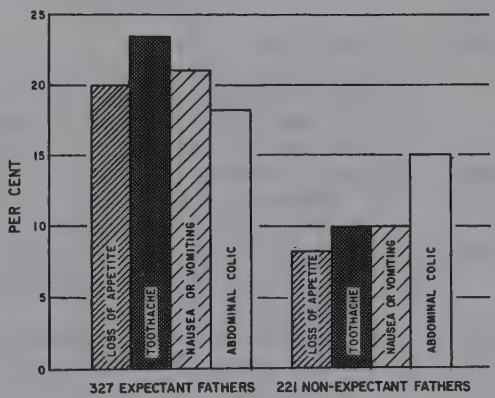
PPCa Cancer Correlated with Mental Illness
PCCb Efficacy of Psychotherapy in Cancer (e.g.; delays of death claimed)
PPCc Cancer Risk Correlated with Personality
PPCd Efficacy of Imagery Therapy in Cancer Treatment

PPD PHENOMENA ASSOCIATED WITH DEATH

PPDa Voodoo Death [PBPi, PPDb]
PPDb Death by Suggestion
PPDc "Deadline" Contributions to Death (e.g.; "birthday effect")
PPDe Sleeping Deaths (e.g.; common among Laotians)

PPE PREGNANCY AND THE MIND

PPEa The Couvade, Male Sympathy Pains, and Other physiological Phenomena
PPEb False Pregnancy in Males (i.e.; pseudocyesis)
PPEc False Pregnancy in Females
PPEd Pregnancy as Cause of Mental Illness in Men
PPEe Hypnotic Induction of Labor



Symptoms of fathers-to-be compared with those of "non-expectant" fathers. (Discovery, 26:30, January 1965.) [PPEb]

PPG PSYCHOGENIC THERAPIES [PPH]

PPGa Orgone Therapy
PPGb Imaging
PPGc Touch and Laying-On of Hands
PPGd Efficacy of Faith and the Power of Prayer
PPGe Application of Inanimate Objects
e.1 Snake Stones
e.2 Mad Stones
e.3 Wooden Magnets
e.4 Canaan Stones
e.5 Black Coral
e.6 Real Magnets
PPGf Placebos
f.1 General Anecdotes [PPHg.1]
f.2 Tests of Efficacy
f.3 Addiction to Placebos
PPGg Marriage Enhance Immune Response
PPGh Role of Mental Attitude and Philosophy in Health and Recovery from Disease
PPGi Efficacy of Psychotherapy
PPGj Efficacy of Yoga
PPGk Claimed Effects of Drugs at a Distance
PPGl Efficacy of Distant Healing (i.e.; by telepathy)
PPGm Use of Hypnosis and Suggestion [See PPH]
PPGn Efficacy of Homeopathy [CAHa]
PPGo Efficacy of Acupuncture
PPGp Efficacy of Feng Shui

PPH HEALTH, HYPNOSIS, AND OTHER PSYCHOGENIC PHENOMENA

PPHa Allergy and Asthma
a.1 Efficacy of Hypnosis
a.2 Psychogenic Factors (e.g.; an artificial rose can induce an allergy attack)
PPHb Migraine Headaches
b.1 Efficacy of Hypnosis
b.2 Psychogenic Factors
PPHc Dental Caries (e.g.; frequency correlated with psychogenic factors)
PPHd Wound Healing (e.g.; hypnotic staunching of nosebleeds) [PPSa.2]
PPHe Sight and Hypnosis
e.1 Hypnotic Blindness
e.2 Acuity Improvement with Hypnosis
e.3 Hypnotic Induction of Tubular Vision
e.4 Hypnosis and Color-Vision Phenomena [See BHO5, PLGh.3]
e.5 Hysterical Blindness
PPHf Hearing and Hypnosis
f.1 Hearing While under Anesthesia
f.2 Hypnotic Deafness
PPHg Body's Motor Response
g.1 Placebo Effect [PPGf]
g.2 Performance Improvement through Hypnosis
PPHh Hypnosis Affecting Body Temperature [PPSl]
PPHi Hypnosis Affecting Body Strength and Endurance
PPHj Hypnosis and Brain's Alpha Rhythms
PPHk Hypnosis Affecting the Body's Electrical Potential Differences
PPHl Hypnosis and Schizophrenia
PPHm Hypnosis and Epilepsy
PPHn Hypnosis and Breast Enhancement

PPI IMMUNE SYSTEM AND PSYCHOLOGY [BHI5]

PPIa Immune-System Suppression Due to Depression [BHI5]
PPIb Hypnotic Enhancement of the Immune System
PPIc Pyschoimmunity (i.e.; immune-system strengthening through psychological intervention (e.g.; willing one's self well)

PPS PSYCHOGENIC SKIN PHENOMENA

PPSa Bleeding [BHF29, PPSi]
a.1 Hypnotic induction
a.2 Hypnotic healing of bleeding [PPHd]
a.3 Bloody sweat [BHF29-X2]
PPSb Hypnotic Induction of Skin Inflammation and Blisters
PPSc Warts
c.1 Efficacy of Hypnotic Treatment
c.2 Hypnotic Creation of Warts
PPSd Effect of Psychogenic Forces upon the Skin's Electrical Properties
d.1 Hypnotic Alteration of Skin

Conductance
d.2 Telepathic Changes of Electrodermal Properties

PPSe Hypnotic Induction of Skin-Writing ("Autography")

PPSf Skin Allergies (e.g.; hypnotic suppression of allergy tests involving the skin)

PPSg Hypnotic Treatment of Eczema

PPSh Hypnosis and the Reemergence of Old Wounds

PPSi Stigmata [BHF29, PPSa]
i.1 Anecdotes of Phenomenon (Abundant cases in the literature.)
i.2 Induction of Stigmata by Hypnosis
i.3 Cure by Hypnosis

PPSj Hypnotic Treatment of Burns

PPSk Hypnotic Treatment of Herpes Simplex

PPSl Hypnotic Influence on Skin Temperature [PPHh]

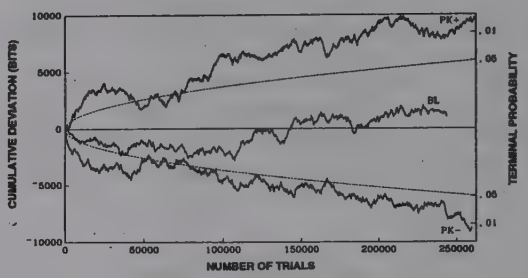
PPSm Psychogenetic Hair Loss

PS PSYCHOKINESIS[26]

PSB HUMAN MENTAL CONTROL OF NONHUMAN BIOLOGICAL PROCESSES
PSC HUMAN MENTAL CONTROL OF CHEMICAL AND NUCLEAR PHENOMENA
PSM HUMAN MENTAL CONTROL OF MACHINES AND MATERIALS
PSP CLAIMED POLTERGEIST PHENOMENA
PST CLAIMS OF TRANSPORTATION THROUGH BARRIERS OF TIME AND SPACE

PSB HUMAN MENTAL CONTROL OF NONHUMAN BIOLOGICAL PROCESSES

PSBa Control over Microorganisms (e.g.; movement)
PSBb Control over Plant Behavior (e.g.; growth rate)
PSBc Control over Animal Vital Signs (e.g., heart rate)



Results from some Princeton experiments in psychokinesis. Curves represent cumulative deviations from chance for higher numbers of counts (PK^+, PK= psychokinesis), lower numbers of counts (PK^-), and baseline (BL). The low probabilities, obtained over 250,000 trials, are statistically very significant. Each operator produced curves with distinctive shapes. (Physics Today, 45:13, October 1992.) [PSMa]

PSC HUMAN MENTAL CONTROL OF CHEMICAL AND NUCLEAR PHENOMENA

PSCa Creation of Photographic Effects (e.g.; claimed "thought" pictures)
PSCb Claimed Creation of Crystal Luminescence
PSCc Claimed Control of Light Propagation (e.g.; light "bending")
PSCd Claimed Modification of Water's Structure

PSM HUMAN MENTAL CONTROL OF MACHINES AND MATERIALS

PSMa Claimed Mental Control of Electrical Devices
a.1 Random-Number Generators
a.2 Computer Operation
a.3 Street-Light Interference
PSMb Claimed Mental Control of Machinery and Instruments
PSMc Claimed Mental Control of (Supposedly) Random Mechanical Devices
c.1 Dice

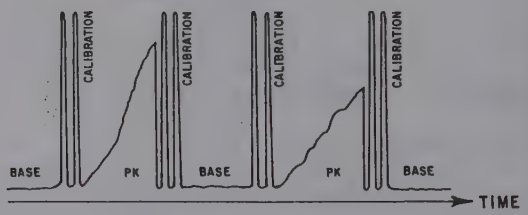


Chart recording of physical changes in a Fabry-Perot interferometer possibly caused by psychokinesis. Base level indicates when the subject was not attempting to influence the instrument. (Science News, 116:358, 1979.) [PSMb]

c.2 Cascades
c.3 Pendulums

PSMd Technojinx (i.e.; claims that the mere presence of certain individuals causes various types of machines to malfunction)

PSMe Effect of Geomagnetism on Psychokinetic Phenomena

PSMf Enhancement of Psychokinesis by "Focussed Group Energy" [PSPf]

PSMg Exhibitions of Spoon Bending, etc. [PIBe.10]

PSP CLAIMS OF POLTERGEIST PHENOMENA

PSPa Spontaneous, Unexplained Sounds

PSPb Claimed Movement of Physical Objects (e.g.; furniture, stones, etc.)

PSPc Fire Poltergeists

PSPd Claimed Control of Room Temperature

PSPe Claims of Weather Control

PSPf Group Psychokinesis (e.g.; PK "parties") [PSMf]

PSPg Direct Writing (i.e.; no human involvement, not automatic writing) [PSTa]

PSPh Typical Seance Phenomena (i.e.; table tilting, rappings, voices, ectoplasm, levitation, etc.) [See PBSj.]

PST CLAIMS OF TRANSPORTATION THROUGH BARRIERS OF TIME AND SPACE

PSTa Claims of the Existence of Apports (i.e.; the sudden, unexplained appearance of objects) (e.g.; the famous Stanford apports, the SORRAT experiments)

PSTb Claims of Apparent Time Warps (i.e.; usually "lost" time)

X MISCELLANEOUS PHENOMENA

XC CROP CIRCLES
XK COINCIDENCES, SERIALITY, SYNCHRONICITY
XS SEARCH FOR EXTRATERRESTRIAL LIFE
XU UFOs
XZ MISCELLANEOUS AND OFTEN-BIZARRE PHENOMENA

PRIMARY SCIENCE SOURCES EXAMINED FOR MISCELLANEOUS PHENOMENA

"Miscellaneous" phenomena were culled mainly from the general-science sources listed in in the beginning of this Outline. However, bizarre phenomena also cropped up---unexpectedly and very rarely---in the more specialized mainstream journals noted at the beginnings of the chapters. The so-called "fringe" literature was assiduously but not totally avoided.

XC CROP CIRCLES

XCO CROP-CIRCLE OBSERVATIONS
XCP CROP-CIRCLE HOAXES AND DEBUNKING
XCZ PHENOMENA ASSOCIATED WITH CROP-CIRCLES

XCO CROP-CIRCLE OBSERVATIONS

XCOa After-the-Fact Observations
XCOb Claimed Real-Time Observations of Actual Formation
XCOc Possible Natural Explanations (e.g.; whirlwinds) [GWW]
XCOd Geographical Concentrations (e.g.; primarily a British phenomenon)

XCP CROP-CIRCLE HOAXES AND DEBUNKING

XCPa Debunking and Responses
XCPb Claimed Hoaxes

XCZ PHENOMENA ASSOCIATED WITH CROP-CIRCLES

XCZa Plant Anomalies (e.g.; plant malformations)
XCZb Geographical Association with Ancient Sites (e.g.; Wiltshire megalithic sites)
XCZc Crop-Circle Association with UFO Observations

XK COINCIDENCES, SERIALITY, SYNCHRONICITY

XKC CLAIMS OF COINCIDENCES
XKS CLAIMS OF SERIALITY
XKT CLAIMS OF SYNCHRONICITY

XKC CLAIMS OF COINCIDENCES

XKCa Selected Anecdotes
XKCb Rational Explanations and General Dismissals of the Phenomenon

XKS CLAIMS OF SERIALITY

XKSa Observations (i.e.; the claimed tendency of certain events to follow one another)

XKT CLAIMS OF SYNCHRONICITY

XKTa Selected Anecdotes
XKTb Statistical Explanations

XS SEARCH FOR EXTRA-TERRESTRIAL LIFE

XSM CLAIMS OF ALIEN CONTACTS AND ARTIFACTS
XSP PHILOSOPHICAL ASPECTS AND STATISTICS
XSS CLAIMS OF ALIEN ELECTROMAGNETIC SIGNALS

XSM CLAIMS OF ALIEN CONTACTS AND ARTIFACTS

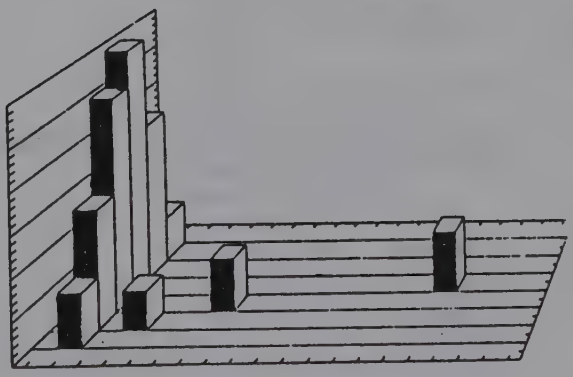
XSMa Claims of Artifacts Left by Ancient Astronauts [ALOd, AMOa, AME3, MMMe]

XSMb Reports, Legends, Drawings, and Myths Relating to Possible of Contacts with Aliens [MGPa, PLGa.5, XUX]

XSP PHILOSOPHICAL ASPECTS AND STATISTICS

XSPa Why We Seem to Be Alone (For many people, there seems to be no convincing evidence of alien contacts.)

XSPb Statistical Expectations of Extraterrestrial Life (i.e.; high---given the number of planets expected in the cosmos) (However, we have only one data point---earth! This is not enough for statistical extrapolation.)



Anatomy of the "WOW" signal. Vertical ordinate represents signal intensity. Horizontal axis is frequency in 10 kilohertz intervals. Time axis runs into the page with 12-second intervals. (Science News, 135:296, 1989.) [XSSa]

XSS CLAIMS OF ALIEN ELECTROMAGNETIC SIGNALS

XSSa Unexplained Signals (e.g.; the WOW signal, Tesla's claim) [GER5]

XU UFOs

XUA CLAIMS OF UNIDENTIFIED AERIAL OBJECTS AND VEHICLES
XUD EXPLAINING ("DEBUNKING") UFOs
XUO CLAIMS OF UNEXPLAINED LUMINOUS AERIAL PHENOMENA
XUX CLAIMS OF ALIEN ABUCTIONS

XUA CLAIMS OF UNIDENTIFIED AERIAL OBJECTS AND VEHICLES

XUAa Historical Observations (e.g.; the 1897 airship "wave")
XUAb Myths and Legends of Flying Machines [MMVf.1]

Sketch of an unidentified object seen in the sky over the Indian Ocean by the crew of the m.v. Baron Pentland in 1983. (Marine Observer, 54:27, 1984.) [XUAa]

XUD EXPLAINING ("DEBUNKING") UFOs

XUDa Mainstream Interpretations of UFO Observations
a.1 As Misinterpreted Conventional Objects (e.g.; astronomical objects, aircraft)
a.2 As Delusions [see PLGa.7]
a.3 As Geophysical Phenomena [GLB1, GLN1, GLN2]

XUO CLAIMS OF UNEXPLAINED LUMINOUS AERIAL PHENOMENA

XUOa General Surveys
XUOb Photoanalyses of Selected UFO Events
XUOc Selected, Difficult-to-Explaine Observations (These data were drawn mainly from the science literature, which is rarely forthcoming on these matters.)
c.1 Arizona Flyover, 1997 (i.e.; the Phoenix Lights)
c.2 Lakenheath, 1956
c.3 Roswell "Landing," 1947
c.4 The Belgian Triangles, 1990
c.5 Gulf Breeze Sightings, 1990
c.6 The Lubbock Lights, 1951
c.7 Foo Fighters, World War II [GLB18]
c.8 The Ghost Rockets, 1945

XUX CLAIMS OF ALIEN ABUCTIONS

XUXa Raw Testimonies
XUXb Testimonies via Hypnotic Regression [PLGa.5]

XZ MISCELLANEOUS AND OFTEN-BIZARRE PHENOMENA

XZZ MISCELLANEOUS BIZARRE PHENOMENA

XZZ MISCELLANEOUS BIZARRE PHENOMENA

XZZa Disappearances
- a.1 Ships (e.g.; Marie Celeste, ghost ships)
- a.2 Philadelphia Experiment (i.e.; claimed military teleportation experiment)
- a.3 Avenger Torpedo-Bomber Squadron (Explanations exist.)
- a.4 Disappearing Regiment (i.e.; claim in Dardanelles campaign, World War I)

XZZb Claims of Foci of Fortean Phenomena
- b.1 Bermuda Triangle
- b.2 Great Lakes Triangle
- b.3 Devil's Sea
- b.4 Llandudno Pentagon
- b.5 Vile Vortices (i.e.; world-wide grid of foci)

XZZc Devil's Footprints (i.e.; curious trails of prints in the snow, 1855, England)

XZZd Animal Mutilations

XZZe Sky Lines (i.e.; seemingly endless strings from the skies)

XZZf Spacecraft Anomalies Correlated with UFO Observations [XZZp]

XZZg Hollow Earth Theories (e.g.; Symmes hole, Agharta, etc.)

XZZh Portentious Numbers (e.g.; 666, 1080)

XZZi Unidentified Aquatic Objects (i.e.; mystery subs)

XZZj Unexplained Appearances of Things and People (e.g.; apports) [PSTa]

XZZk Curious Ciphers and Codes (e.g.; Bible Code, Bacon cipher) [MGWg]

XZZl Geomancy Claims

XZZm Nominative Determininsm (i.e.; professions correlated with family names)

XZZn Simulacra (i.e.; natural things that appear artificial) (e.g.; New Hampshire's "Old Man of the Mountain") [AMOa]

XZZo Pyramid-Power Claims

XZZp Unexplained Machine Phenomena: Amusing and Anecdotal
- p.1 Curious Effects of Cats Walking on Computer Keyboards
- p.2 Natural Objects Picking up Radio Signals (e.g.; ship's rigging, human tooth fillings)
- p.3 Computer Mistranslations of Foreign Languages
- p.4 Spacecraft Unprogrammed Autonomous Operations [XZZf]
- p.5 Apparent Cyberlife (e.g.; autonomous computers evolving into more complex entities)
- p.6 Rogue Hyphens in Word Processing

XZZq Evidence that Elongated Bodies Tend to Orient Themselves North-to-South

XZZr Spontaneous Fires [PSPc]

XZZs Claims of History Repeating Itself

SOURCEBOOK-PROJECT REFERENCES

The books listed below were published by the Sourcebook Project between 1977 and 2001. Their numbers are keyed to the superscripts at the ends of the Section titles (i.e.; the headings with doublet code letters).

The more recent Catalogs (numbers 1-20) use the same alphanumeric coding as this Outline. For those Outline entries with codes ending in an Arabic numeral, the Catalogs will provide considerable detail for each phenomenon, as well as all of the references on file at the time-of-writing, and illustrations where feasible.

1 Lightning, Auroras, Nocturnal Lights (section GL)
2 Tornados, Dark Days, Anomalous Precipitation (section GW)
3 Earthquakes, Tides, Unidentified Sounds (sections GH, GQ, GS)
4 Rare Halos, Mirages, Anomalous Rainbows (section GE)
5 Remarkable Luminous Phenomena in Nature (section GL)

6 The Moon and the Planets (sections AE, AH, AJ, AL, AM, AN, AP, AR, AU, AV)
7 The Sun and Solar System Debris (sections AA, AB, AC, AE, AS, AX, AY, AZ)
8 Stars, Galaxies, Cosmos (sections AO, AQ, AT, AW)

9 Carolina Bays, Mima Mounds, Submarine Canyons (section ET)
10 Anomalies in Geology (section ES, in part)
11 Neglected Geological Anomalies (section ES, in part)
12 Inner Earth: A Search for Anomalies (sections EC, EQ, ES in part, EZ)

13 Biological Anomalies: Humans I (section BH, in part)
14 Biological Anomalies: Humans II (section BH, in part)
15 Biological Anomalies: Humans III (section BH, in part)
16 Biological Anomalies: Mammals I (section BM, in part)
17 Biological Anomalies: Mammals II (section BM, in part)
18 Biological Anomalies: Birds (section BB)

19 Ancient Infrastructure (section MS, in part)
20 Ancient Structures (section MS, in part)

21 Handbook of Unusual Natural Phenomena (chapter G)
22 Ancient Man: A Handbook of Puzzling Artifacts (chapter M)
23 Mysterious Universe: A Handbook of Astronomical Anomalies (chapter A)
24 Unknown Earth: A Handbook of Geological Enigmas (chapter E)
25 Incredible Life: A Handbook of Biological Mysteries (chapter B)
26 The Unfathomed Mind: A Handbook of Unusual Mental Phenomena (chapter P)

27 Science Frontiers: Some Anomalies and Curiosities of Nature (all chapters)

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